



J. P. Knapton Sculp.

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OBSERVATIONS IN HUSBANDRY.

By EDWARD LISLE, Esq;

LATE OF

CRUX-EASTON, in HAMPSHIRE.

Satis mirari non possum, quòd animi sibi quisque formatorem præceptorumque virtutis è cætu sapientium arcessat; sola res rustica, quæ sine dubitatione proxima & quasi consanguinea sapientiæ est, tam discentibus egeat quam magistris. Adbuc enim scholas rhetorum, & geometrarum, muscorumque, vel, quod magis mirandum est, contemptissimorum vitiorum officinas, gulosius condiendi cibos, & luxuriosius fercula struendi, capitumque & capillorum concinnatores non solum esse audiui, sed & ipse vidi: agricolationis neque doctores qui se profiterentur, neque discipulos cognovi. Cum etiam, si prædictarum artium civitas egeret, tamen, sicut apud priscos, florere posset respublica; nam sine ludicris artibus, atque etiam sine causidicis olim satis felices fuere futuræque sunt urbes; at sine agricultoribus nec consistere mortales, nec ali posse manifestum est.

COLUMELLA, lib. 1.

THE SECOND EDITION.

IN TWO VOLUMES.

VOL. I.

L O N D O N:

Printed by J. HUGHs, near Lincoln's-Inn-Fields:

For C. HITCH and L. HAWES, J. RIVINGTON and J. FLETCHER, in Pater-noster-row; W. SANDBY, in Fleet-street; J. RIVINGTON, in St. Paul's Church-yard; and R. and J. DODSLEY, in Pall-Mall.

M DCC LVII.

OBSERVATIONS

ADVERTISING

BY EDWARD LESTER

A
Some of the most
important and
interesting
to the public
in giving him
a new
moment



THE SECOND PART

IN TWO VOLUMES

VOL. I

LONDON
Printed by J. G. & J. S. Smith, 10, Abchurch Lane, in the City of London.
1844

ADVERTISEMENT.

AS I think myself obliged to make some apology for the uncommon form in which the following observations are offered to the public, I beg leave to detain the reader a few moments, in giving him a short account of my father's design in making and collecting them, with the method he pursued in it, and the reasons that induced me to print them in the manner they now appear.

To enter into a detail of the author's life and character would, in my opinion, be no ways necessary to this work, nor could I perhaps say many things I know of him, without drawing some imputation of vanity on myself. It may be sufficient therefore to take notice, that he settled at Crux-Easton in Hampshire, as far as I can collect, about the 27th year of his age, and in 1693, or 4, where he immediately de-

iv A D V E R T I S E M E N T.

terminated to make the study of agriculture one of the chief amusements of his life.

In pursuance of this resolution, not only at the place, and in the neighbourhood where he lived, but in his journies, either to Dorsetshire, where he had concerns, or to Leicestershire, in visits to his father-in-law, Sir Ambrose Phillipps of Garenton, or to his own estates in Wiltshire and the Isle of Wight, and to other parts of the kingdom, he made it his business to search out the most reputable farmers, and get the best informations he could, in all the branches of husbandry that were known and practised in those countries. His constant method was to note down the opinions and advices he thought might be useful to him, and afterwards to add occasional remarks on them from his own experience. For many years, I believe, he had no other drift, in employing himself after this manner, than merely his own information and improvement; but about the year 1713, he seems to have entered into a design of making his observations public; for I find he had begun an index, and had
thrown

ADVERTISEMENT. v

thrown together some thoughts, as an essay towards an introduction, dated at that period. Though his other studies however, which were chiefly in divinity, in which he hath left a very long and laborious work; his frequent attendance on the business of his neighbours in the capacity of justice of the peace, and the care of a numerous family (for he had no less than twenty children, of whom seventeen survived him) hindered him from pursuing this his intention, yet they did not interrupt his first design, but he continued writing down his inquiries and experiments to the time of his death, which happened in the year 1722.

As these observations therefore were left in such disorder, as to require no small pains and application to regulate and digest them, and as all his sons, except the eldest, were bred to professions, and those very foreign to that of agriculture, and had neither leisure nor inclination for an undertaking of this nature, they would, in all probability, have been entirely suppressed, had not I accidentally communicated them

vi A D V E R T I S E M E N T.

to some farmers of my acquaintance, as likewise to some gentlemen, who amuse themselves in husbandry, who were all of opinion they might be of use to the profession, and encouraged me to collect them under their several heads, and put them into the order in which they are here published.

Some of his readers will smile, no doubt, to see the names of many of our English farmers mingled together with those of the ancient Romans, Varro, Cato, Pliny, Columella, and Palladius, and with those also of our own writers, Lord Verulam, Evelyn, Ray, Grew, Boyle, and Mortimer ; but, had I thrown them out, I must have given an entire new form to the whole, and when I had done all this, the reader, in my judgment, would have owed me no thanks for my pains : it would have robbed the work of an agreeable simplicity, and made it appear less genuine. I was inclined therefore to print it as I found it, and was pleased to find this inclination seconded by the advice of many of my friends.

For

ADVERTISEMENT. vii

For the stile, I think, I need make no apology; for what correctness can be expected in observations hastily penned down, and those oftentimes from the mouths of common farmers? In a book intended for the instruction of husbandmen ornaments would be misplaced: it is sufficient if the language be intelligible; nor is it at all my wish, that the author should be esteemed a fine writer, but a useful observer.

The reader must not expect a compleat body of husbandry in these papers. Some things are but slightly touched on, as hops and rye, and some others not mentioned at all, as hemp, flax, &c. and many useful observations might perhaps be added, even in those matters that are treated on at large, and in which the author was most conversant; for such is the extent and variety of the subject, that, according to his remark in the introduction, it is never to be exhausted. Every day produces new inventions and improvements in agriculture, but perfection is unattainable; and, I believe, there is no farmer, of whatsoever industry, age, judgment, and experience,

viii ADVERTISEMENT.

rience, that is not often deceived, and that will not acknowledge himself deficient in many particulars relating to his profession.

Nor is the knowledge of husbandry to be acquired by reading without practice. Books may give valuable hints to those who have judgment to make use of them, but, to learn the first rudiments of this art, it is necessary to serve an apprenticeship to it as to other trades. Many, and indeed the chief part, of these observations therefore are not calculated for the instruction of mere novices, but to assist those, who are already practitioners; to shew them the opinions of others in doubtful and disputed cases, the rules laid down by the ancient and modern writers, and the usages of distant counties in this kingdom; to encourage them in making trials; to caution them against many errors; and oftentimes save them much labour and expence, by communicating experiments already made to their hands.

As Mr. Lisle however began his collection at a time when he was but young in
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ADVERTISEMENT. ix

the business, and that purely for his own information, there are some rules in it, without doubt, that experienced farmers will have no need of, and some perhaps that may be thought of too little importance to enter into a work of this kind ; but however common and unnecessary they appear to some, they may be new and useful to others. Whatever imperfections there are of this nature, I must submit to take them on myself, and freely acknowledge, I know not how to separate the chaff from the corn. I intreat the reader's favour therefore, that, whatever such faults he finds, he would impute them to my ignorance in this art or science, and not to the author, who died without revising, or putting his observations into any form, and who probably would have made them better worth the public view, had it pleased God to have continued the blessing of his life to his family.--Such as they are, they are all copied from his manuscript, not scraped together from other books for the sake of gain, and would never have seen the light, had I not thought they would be of benefit to my countrymen ; and, that I may
be

x ADVERTISEMENT.

be the more readily believed, I assure them, except a few copies to present to my friends, I reap no kind of profit from the publication.

Burclere, Hants ;
Sept. 1, 1756.

THOMAS LISLE.



THE

THE
AUTHOR'S
INTRODUCTION.

M DCC XIII.

IT may be looked on, in my opinion, as one of the chief misfortunes of this age, that we have not such honourable conceptions of a country life, as might engage our gentlemen of the greatest abilities in parts and learning, to live upon and direct the management of their estates. It is what I have in my most serious reflections often lamented, not only as a considerable disadvantage to themselves, but a great loss to the public. Among the Greeks the knowledge and estimation of agriculture was at the greatest height in their best times; among the Romans their senators ploughed; and the great examples they gave of virtue and industry laid the foundation of all their after-greatness; but as agriculture decreased in their esteem, luxury took place, and soon put a period to their power.—I would recommend it to our English gentlemen to consider how much this may be our case at present; to look round them, and see how many fine estates are daily mortgaged or sold, and how many ancient and noble families destroyed by this pernicious and almost epidemic turn to idleness and extravagance. The yeomanry of England, who in former times were the
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flower

xii INTRODUCTION.

flower of our militia, and the 'boast of our nation, have always continued to be of great consequence and use to us, and a very necessary link in the chain of government, as having an immediate connection with the gentleman on the one side, and the labourer on the other. Being distributed among the several parishes, and fitted for various offices, under the ecclesiastical and civil jurisdiction, as of churchwardens, overseers, headboroughs, and the like, which will not hereafter be so worthily filled, they carried a respect with them, and were of especial service in keeping the meaner people to their duty; add too, that, being men of substance, they were of wonderful advantage to the neighbourhood they dwelt in, by employing the poor, by affording them comfort and assistance in their sickness or misfortunes, in advising them in their family concerns, and in composing differences among them; and also to the commonwealth in general, in keeping up a spirit of liberty in the country without licentiousness, in withstanding corruption and oppression, in maintaining the laws, and in asserting the privileges of a free people. These too however have caught the infection, and will be mimicking the manners of their betters: it is a melancholy truth, but I speak it knowingly; I see old reputable families in my neighbourhood every day falling away to nothing, and may take upon me to prophesy, pass but a few years, this race of veterans will be lost in the kingdom. Nor can the gentry, with like management, be long able to survive them; they must one way or other return to their original, the plough; if they will not do it by choice, and for their own advantage, they will hereafter be necessitated

INTRODUCTION. xiii

sitated to do it for the advantage of others ; for we seem to be forming ourselves apace after the French model, here and there a great man, the rest all vassals and slaves. As this threatens to be the case, I should think it no small happiness, and myself no inconsiderable patriot, if I could contribute any thing towards raising the reputation of husbandry among the gentlemen of this kingdom. It is an undertaking, I acknowledge, that affords but little prospect of success ; for so far are we now from esteeming it either honourable or gainful, that we will not suffer it to be ranked among the liberal arts, and that we look on it as the high road for a gentleman to be undone ; nay, it is become so decried, and out of fashion, that the writing on the subject seems to render me accountable for an apology. I am satisfied notwithstanding, if gentlemen would use such proper methods to attain a skill in this, as they must do to be masters of any other art or science, they would soon find an entertainment in it not unworthy the most exalted genius. It was the method of life that our Creator first designed us, and that to a farther end than our temporal good alone. Other worldly business carries our minds off from God, whereas in this we draw nearer to him, not only as the country life gives the greater opportunity vacare Deo, but as the business of husbandry is of that nature, as must often raise in us good reflections, and turn our thoughts towards him. Every season, and every change of weather in the season, awakens in us the consideration of his providence, and a more than common sense of our dependence on his blessing, from the perpetual occasions we have of observing and reflecting how he gives us our daily bread.

A man

xiv INTRODUCTION.

A man cannot be busied in the offices of husbandry (they consist of so great variety) but many things will come under his observation, from which divine, moral, and philosophical conclusions are so natural and obvious, that, if he will avoid making them, he must shut his eyes against the light of the sun. It is a great mistake therefore in those gentlemen, who consider husbandry as too narrow and mean a business for a person of parts and education to employ himself in. Can they propose a nobler entertainment for the mind of man than he would find in the inquiries he must make into all the powers and operations of nature wherein husbandry is concerned? The subject is so vast it can never be exhausted; could he live, and spend ages in agriculture, he might still go on in his searches, and still make fresh discoveries, that would excite afresh his admiration of the riches of God's wisdom. Add too, that scene of nature, which the country lays before us, has I know not what charms to calm a man's passions, and so to compose his mind, and fix his thoughts, that his soul seems to be got clear of the world; and the farther his education enables him to carry his inquiries, the higher are his reflections raised. In the fields methinks God is walking, and, it is to be hoped, when he finds man so virtuously employed, in the way of his own designation and appointment, he may be pleased so to visit him with his grace, as to give more light and warmth to the good thoughts at that time in his mind, and to fix a deep impression of them on his heart.

If we consider husbandry in regard to our temporal good, provided it be carried on with industry and judgment, it is a sure way to improve our fortunes,
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INTRODUCTION. xv

and indeed the only way the landed gentleman can take ; it were to be wished therefore they would exhort their children early, particularly their eldest sons, to think of it with emulation, and to enter into it as a school of profit and education ; whereas it is rather looked on as a purgatory for the disobedient, a scene of punishment, to which a son, who answers not his father's expectation, is to be abandoned ; or a condition of life of which none would make choice, but such whom fortune has not in other respects favoured. If the country-gentlemen therefore frequently consist of persons, who are either rusticated by their parents in anger, or who, making a virtue of necessity, settle on their estates with aversion or indifference, it is no wonder the comedians exhibit them on our stage in so despicable and ridiculous a figure ; but this is the fault of the persons, and not of the art. Were they properly initiated in the study of agriculture, and pursued it as they ought, it would be so far from excluding them from useful knowledge, and bringing them into contempt, that I may venture to assert, they would find it the best school of education, and the fittest to prepare them for the service of their country in the two houses of parliament of Great Britain.

It is not only an employment, whereby the health and constitution is established, which is very necessary for the attendance on, and the discharge of that great duty, but the business of husbandry, if they will not mispend their precious opportunities, brings them acquainted with the condition and mystery of all sorts of inland trades, inasmuch as, for the most part, they depend on, and have relation

xvi INTRODUCTION.

tion to the plough, or produce of the land, and their interests are mutually interwoven with the husbandman's; nor can a discouragement fall on husbandry, either by bad seasons, or an ill timed act of parliament, but the meanest artisan, the merchant, and even the sovereign on the throne must feel it. Thus we see it is a vast field of science the husbandman is exercised in, and undoubtedly it must be a very great advantage to him, and give him weight in either of those assemblies, by furnishing him with solid arguments, and enabling him to deliver his opinion clearly and confidently on what he thoroughly understands and knows. It is a general observation, that they speak best, and are best heard, who are more of an active than bookish life; the infirmities of the latter leading them oftener to adorn themselves than the subject, and to take a compass, to shew rather what they have read than what is only pertinent to the debate: men of business are concise in words, and choice in matter; men of small experience and great reading voluminous in both kinds.

Again, it is surely no small recommendation to husbandry, that it is productive of long life and health. The nerves and all the solids of the farmers and labourers bodies are much stronger than those of gentlemen, who live an idle and unactive life, their fluids much purer and unmixed; their bones consolidate easily; their strained ligatures return soon, and with small help to their tones; their blood circulates better, and opens the channels of the vessels in bruised places of its own accord, sooner than in a gentleman by the assistance of oils and plaisters; and ordinary medicines work more successfully on
their

INTRODUCTION. xvii

their diseases than the most sovereign specifics on persons of higher quality. As they are less passive therefore in their constitutions, they often arrive at their fulness of years, which citizens, and gentlemen who are not exercised in country employments, seldom reach.

From what has been here observed of the strength and athletic condition of the countryman's body, it is easy to conceive how a greater share of health should be his portion; and here I take upon me to affirm, that I have made myself acquainted with the diseases of the farmers and labourers in my neighbourhood, and have hardly found one who is subject to either gout, stone, or cholic, or indeed to any chronical distemper; nor do they lie under that common infirmity of the gentry, arising from ill habits of body and mind, called vapours, which is such a drawback from life, as to ballance it's value, and render it little preferable to death. Their senses also seldom fail; but they enjoy a comfortable use of them throughout their old age. Their appetites to their food are much keener, and they receive much more nourishment from it than the idle part of mankind would do from the same in quality and quantity, or indeed from the richest soups and sauces; for their bowels are faithful stewards of what they are entrusted with; they strain it to the last drop, and fling away nothing to waste. I have observed in their death-bed sickness they have kept a sound memory and understanding, within a few minutes of their last extremity; for their nerves, having not been vitiated in their tones by debauches, are strong; and the juices of their bodies not being depraved by viscid, grumous, and inflamed materials,

xviii INTRODUCTION.

rials, the diseased matter is not so fiery as to affect them with such sad delirious symptoms as the fevers of the gentry are commonly attended with.

The husbandman's death's blow is generally from a great cold, to catch which he probably took a method sufficient to have killed the strongest animal. For the most part I have found it proceeded from imprudence, in standing still without his cloaths, or drinking a great quantity of small beer, when in a violent sweat, by which the cold has struck so deep as to coagulate the blood and juices, and deaden the tones of all the solids; so that the difficulty has been to set the wheels again in motion, and to open obstructions by giving a spring and hurry to the blood. But even in this his last and dying state, as I said, his complaints are few, in comparison to what I have seen those of higher condition labour under; and his brain is not disturbed like theirs in the common malignant cases; and this is no small advantage and comfort to our husbandman, who is hereby enabled to settle those worldly affairs he had before neglected, to recommend himself to the divine mercy, and, like a patriarch, to bestow his dying blessing on his children. Before I leave this article, concerning health, let me in particular recommend the consideration of it to men of letters. I make no great question, if they would plough one day, that is, busy themselves as husbandmen usually do, and study the other, they would improve the state of learning far beyond what they now do or can. My meaning is, they would probably live longer, enjoy much greater health, and more active spirits; whereas the studious inquirers after knowledge, for the most part, bring early decay on themselves, for want

INTRODUCTION. xix

of free use of air and exercise, and relaxations of the mind; and, tho' moderate in other respects, yet through the common irregularities incident to bookish people, by the time they arrive to a little more than the middle age of man, they are under complicated distempers, of an irreparable and broken constitution, and the remaining part of their lives is spent in nursing their infirmities, and pursuing knowledge in a sickly and ungrateful manner.

But, among all the advantages arising to a gentleman from the employments of a country life, the principal is that of doing good, of which no one, in a private station, has greater opportunities. If he applies himself to the variety of country business as he ought, he will not only give bread to a great number of indigent and industrious people, but his actions also are on the stage; his light is not buried under a bushel. The characters of those who live in a great city, where they have few transactions with their neighbours in the same street, are lost by their dispersed dealings, at distant places, and among people unknown to each other; an excellent person therefore cannot in this situation be proposed for a public example, to attract the veneration of his neighbourhood. His secret admirers are strangers to one another, and to the inhabitants near him, and perhaps know but single instances of such a gentleman's worth; whereas it is the uniformity that gives the great lustre to his actions, and renders them most amiable. With the gentleman, who is engaged in country affairs, it is far different. He must unavoidably concern himself with the families of the farmers and labourers round about him, and

xx INTRODUCTION.

with the tradesmen of the neighbouring towns and villages; and, if he be of shining virtues, I cannot conceive but he must be a great blessing to the parishes within the knowledge of him. By his frequent dealing with, and employing the inhabitants, he will of course have some cognisance of their lives and conversations, and having an opportunity of knowing them, may encourage them as they seem best to deserve from God and man. They too, in their return, even the lowest labourers, from frequent and intimate views, will conceive a noble idea of their master, which will be heightened by their concurrent testimony when they meet together: by his actions and sentiments they will quadrate their own; and, if he be of a piece, and uniform through all the parts of a good and prudent life, he is mistaken much, if he thinks the benefit of his virtues confined to himself only: he is observed and imitated by this ordinary sort of people, and it is they too, for the chief part, that will fix the character he must bear. The discourse on their master is the sauce to their bread and cheese, when two or three at breakfast or dinner-time sit under hedge; nay, their work by the task also shall loiter but some remark they will make on the conduct of one gentleman or other; and we cannot be ignorant that every person of this station in the country has acted a part, either good or bad, sufficient to occasion a general talk in the neighbourhood; his speech and behaviour in all his dealings are reported again, tho' but one witness present, and how just or how disagreeable his sentiments or actions were, in any case that happened, is canvass'd amongst them and judgment is pass'd on his wisdom, virtue, and religion.

INTRODUCTION. xxi

religion; and the labourer's wife must hear the tale over again when the husband comes home. In a word, there is no action so minute in a gentleman but it is worth the gazing on; and, though it be of a nature indifferent, yet the manner of doing it may carry an unaffected beauty and grace with it, which if it does, be assured, these country people will see a great way into it, and secretly revere the person according to his merits. Nor is this all, for the respect they bear him shall influence their thoughts, crush their evil imaginations, lest he, if they proceed to action, should have the knowledge of it; so that a country gentleman, especially if in commission of the peace, shall, in this station, do a world of more good in preventing evil by his example, than by punishing it. If, in the course of country business, he determines differences without humour and peevishness, shews a displeasure without anger or swearing, sets a mark of distinction according to justice and equity, the common people are sensible enough of the right judgment: he sows wisdom and goodness in their hearts, and the increase may certainly be expected amongst them.

I have but one word more to add to the advantages of husbandry already enumerated, which is, that of all professions there is none more innocent or more pleasant. The business of it goes on, in a known and certain course, from season to season, from year to year; the gains from it are most satisfactory to a scrupulous conscience, because our goods are sold in an open market, are set up together with those of our neighbours, and of the same kind and species, whereby the ignorant may make the better comparison of their worth; we do not grow

xxii INTRODUCTION.

rich by jobbing, or by buying or selling again, the profit of which too often consists in outwitting and preying on one another; but our advantages arise from the gifts of our beneficent mother, the earth, whose gratitude generally requites the tiller's care, and by whose increase we hurt nobody; our dependence, next to God's blessing, is on our own industry and skill, and, tho' the season disappoints us sometimes, yet that disappointment is neither so often, so great, nor so fatal as the disappointments of those in other professions, whose trust and dependence is more on man. What miserable calamities fall out from the necessary trust in trade one citizen must give to another, and to his customers, whereas the farmer sells for ready money: he may thrive also without supplanting his brother, which the courtier can rarely do.—Certainly that person must live a pleasant life, whose death every one desires to die; and there are very few, of any art or employ, but who propose to themselves, if they are able, a country retirement, with at least some little of husbandry, in the last stage of their lives. If so tho' other occupations may be in themselves innocent, yet this almost universal desire in men to quit them before they die, looks as if they found it difficult to discharge their consciences in them: they must be sensible, they can make no great figure as husbandmen, but there is some delight even in negative virtue, in being awake, and doing no ill.

To conclude; as I have had some taste and relish of these pleasures, I am desirous to propagate the sense of them as universally as I can, and it would greatly add to my own satisfaction to have partakers with me in the enjoyment of it.

OBSER



OBSERVATIONS I N H U S B A N D R Y.

A R A B L E L A N D.

§. 1.  ALLADIUS has laid down ^{Of the qua-} the following rule, by which ^{lity of} we may make a judgment of ^{land, and} how to ^{judge of it.} of the good or bad quality of land ^a. Dig a ditch, or hole in the ground; and if, on casting in the earth again, there is too much to be contained in the place it came from, this shews it to be a rich soil; if the hole would have taken a greater quantity, it is a mark of a poor soil; but, if it just holds it, the soil is of a middling quality.

It is an indication of a good soil, says Pliny, if the crows and other birds flock eagerly to the new-turned-up earth, and follow close on the ploughman's heels ^b. I doubt not indeed but the sorts of

^a Pinguem terram sic agnoscis, scrobe effossâ et repletâ si superaverit terra, pinguis est; si defuerit, exilis; si convenerit æquata, mediocris est. Pallad. fol. 51.

^b Est indicatio bonæ terræ, si recentem exquirunt improbæ alites vomerem comitantes, corvique aratoris vestigia ipsa rodentes. Plin. lib. 17. ch. 5.

beetles,

beetles, which lay their maggots in the ground in autumn, and are to be produced in spring (such as the rook-worms) are so wise as to lay them in rich ground, that they may be the better nourished, as other insects do also choose the tenderest plants to lay their brood on. Worm-earths also abound most in the richest land.

If you observe any ground to bear a light crop of corn, and at the same time to be grassy, it is to be presumed the ground, thus running to, and bearing grass, would have born corn also, if it had been well managed, and that such ground is in good heart; but, if ground bears little corn, and no grass, it is very suspicious that such ground is poor.

Mr. Evelyn observes, there are diverse indications, by which we may know good mold or earth, as, among others, an infallible one is it's disposition to melt, and crumble into small morsels, not turn to mud and mortar upon the descent of gentle showers, how hard soever it seemed before, and if in stirring it rise rather in granules than massy clods. As the kind of it's natural plant is, says he, you may prognosticate for what tillage, layer, or other use the ground is proper; thyme, strawberries, and betony direct to wood; and Sir Francis Bacon takes notice, as have others also, that camomile (I suppose he means mayweed) shews a land is disposed to corn, burnet to pasture, mallows to roots; but moss, rushes, wild tansy, sedge, flags, fern, yarrow, and where plants appear withered and blasted, shrubby and curled, (which are the effects of immoderate wet, heat, and cold interchangeably) these are natural auguries of a cursed soil. — When there is any vein of ground that breaks up iron mold, no corn will grow there.

§. 2. * The ancient writers agree, that a deep and moist soil, and Palladius adds a chalky also, is most suitable to wheat, and a light dry soil to barley, which will be killed, they say, if sown in wet muddy ground; (and so indeed barley might very well be in their countries, where it was sowed in November) that wet ground agrees best with peas and beans, which, if committed to a dry soil, will perish in the earth, or, if they are not absolutely killed, will come up in a sickly starved condition; that the rest of the leguminous kind will bear a dry soil, but thrive most in a wet one: of all these however I shall treat under their several distinct heads.

§. 3. Mr. Evelyn does not reckon loam among the clays, though it seems to be but a succulent kind of argilla, imparting a natural ligament to the earth, where you mix it, especially the more friable, and is therefore of all others the most excellent mean between extremes; fastening and uniting that which is too loose and stony, cooling that which is hot, and gently entertaining the moisture. Of loam.

§. 4. I see plainly by the temper of a field this year (1706) (sown with barley on wheaten fallows) which is mixt land, and also by the temper of my clay-lands, (sown after a whole fortnight of dry and hot weather, at the latter end of March, and three weeks cold drying windy weather following in April) that lands of the vales of England, or strong Of strong clay lands.

* Spissa, et cretosa, et humida terra bene far et triticum nutrit, hordeum agro soluto delectatur, et sicco; nam in lutoso sparsum moritur. Pallad. lib. 1. fol. 53. Hordeum in terra non humida sed valde arida potius ferere oportet, frumentum verò in lutosa et humida terra seminandum est; in tali enim magis augetur: fabus autem et pisum in lutosa ferere convenit; in arida enim conciduntur priusquam enascuntur, et pereunt; quæ verò non conciduntur degeneres fiunt: reliqua legumina sustinent quidem in arida terra sationem, verum meliora etiam ipsa fiunt et generosiora in irrigua seminata. Leontius in Geoponicis, fol. 43.

clay-

clay-lands, such as they are forced to ridge round cannot but be moist enough to bring up the corn even in the driest summers.

Id. and of
taming
them.

At Oxford (anno 1708) in discourse with Mr. Bobart about the best methods to tame harsh, churlish, obstinate clay, he said, by experience he had found the best way was to fling it up in ridges in the winter, and after the first frost, when it thaws and molders, to fling and temper amongst it ashes or chalk, or whatsoever you have to qualify it; for the time being nickt, wherein you can catch the clayey corpuscles under the greatest disunion and separation, is the time for keeping them so, by mixing these other lighter bodies amongst them, which will the longest prevent them from their re-union: this I think to be good advice.

To prevent
land from
baking.

§. 5. If some sorts of stiff and binding land be sown dry, and a sharp scudd of rain falls before the earth has time to settle, it is observed that the crust of such land will bake, so that the corn cannot come through, to the great damage of a crop; this evil happens not, if after such a scudd of rain cool cloudy weather ensue, and not hot sun-shiny; for then the earth will not lie so hollow as to be baked. The best way I think to prevent this, when one has such land to deal with, is, to roll it immediately after sowing, which fastens the earth together, whereby the sun has not that power of piercing into it, and consequently not of baking it.

What
grain to
sow on
baking or
binding
land.

§. 6. I have a field that is very apt to bind, if rain comes on soon after it is sowed with spring-corn, and a hot gloom on it, so that the corn cannot come through; therefore I advise that such ground, a stiff clay, be sowed, as often as conveniently may be, with winter-corn, such as wheat and vetches; for though wet comes then, the sun is not strong enough at that time of the year to scorch the ground up and to bind it; and it is observed

served that this ground has been always lucky for vetches, which I suppose is for the reason above.

§. 7. "A land that eateth up the inhabitants ^{Of white land.} thereof," Numb. xiii. 32. may very properly be applied to some of our chalky hill-country land, which, in return for ploughing and all charges, brings the farmer out of pocket.

Some of my neighbouring farmers coming to see me, one of them asked me if I intended to sow a certain field with wheat this year (1707); I said, yes. He replied, he thought it would not bear twice ploughing, being white land, and having lain still but two summers; and, said he, for one earth it had better lie still three years. I asked him why; he seemed to be at a loss about a reason; I told him, I thought the reason of what he said depended on the firmness and fatness of the ground; for, said I, if white land that is lay, is loose at top, and not very close and well settled, then it is too early to sow it on one earth, because the bottom that is turned down will be loose, and consequently will not hold rain well enough, but it will run through too soon. Said he, you say well; but my reason is, because this field is apt to have redweed; and if such land with us is ploughed up under three years, and sowed to one earth, we observe it runs much to weed. If that holds, said I, the reason must be, because the seed of the redweed being turned under the earth, where there is not a fastness it grows through, whereas, where the land is fast, it is choak'd; but this field seeming to me a fast and well-settled white ground, the reason will not hold in either case.

Note, it is common with farmers to say, that generally their whitish land, unless a very barren mortar-earth, produces as good wheat and barley, and fuller bodied, than their clay-land and stronger earth: but I doubt the reason of it is, because the
lighter

lighter whiter earth needs not more tillage than they give it, and is not much damaged with unseasonable ploughing; whereas the clay-land is seldom ploughed enough by them, and that often unseasonably, by which it much suffers.

Of black
spongy
land.

§. 8. About the middle of a field near me, there runs a vein of black, coary, spongy, and yet dry earth, of the colour of Bagshot-heath, only dry; in this land the farmer never had good corn in his life-time, but here and there a tuft; therefore he never more sows it. In Woodcot-down there is such a piece of land abutting to this field; the farmer burn-bak'd it, notwithstanding I told him he would have no corn; and he had none.---Note, in these sort of grounds the rook-worms are bred; and where rook-worms breed argues a rotten loose earth, but not always fit for corn, notwithstanding my former remark on the sagacity of those insects; this black land to many strangers would promise more than any other land on the farm.

Of red,
sandy
land.

§. 9. A red, sandy, ferny ground, not worth twelve-pence per acre, should be managed thus: the sword of the ground is not to be killed under two or three crops, if you winter-fallow for summer corn; and such ground will be so beggar'd as to bring but pitiful grasses after two or three crops, which crops also are likely to be very mean; therefore I propose that such ground should be Midsummer-fallowed to rot the roots of the grass, and stirred in the winter, and ploughed and sowed with black oats and rye-grass early in the spring, and sowed very thick, so as to bind the ground by such means; this ground will be in good heart to bear the rye-grass, and hold it a year or two, or longer; then this ground is to be ploughed up, and managed again in the same manner; for such ground will pay best to be laid down to grass.

§. 10. Some of my grounds are subject to blight, ^{Of land subject to blights.} for which reason I would never plough such a ground to white oats or barley, though never so good; for barley and white oats must be sown later than other corn, and consequently will not have so much time to be settled in the ground, for which reason such a ground will be more subject to blight; black oats therefore, and wheat, I hold the properest grains for such ground, and do believe in such ground the black oats should be dragged in.

I sowed barley the second and third days of May, anno 1703; I had a great burthen of rath-ripe barley, but thin and blighted for the most part; for indeed clay-land is so slow in forwarding corn, especially if it lies to the north, and has a hedge-row to the south to shade it, and a wet summer to boot, as there was this year, that 'tis not to be expected it can carry a full-bodied corn; therefore such ground ought to be sowed earlier. I observed on the north side of the hedge-row, where the head-land was, the corn seemed riper than any in the field, but very thin of flower, which I take to be, because it had so little sun, that nature could not carry it on to it's perfection, consequently, having done it's utmost, the corn soon withered and grew dry.

Our white land at Crux-Easton, though poor, is said to bear the best bodied corn, which I am satisfied, according to the common way of management, it does in wet or dripping summers; but, if the summer proves very dry, as this year (1704) was, I find the barley, especially before it begins to ripen, shrinks and runs to a brown colour, and blights, the ground not being able to nourish it any longer; when the clay-land shall better support it's barley, and produce a fuller and finer rin'd grain: the leaves on trees in white land in such years shall soon decay and turn yellow.

The reason why those grounds which hang from the horizon to the east are most subject to mildew, and to blasting, may be (as I judge) from the sun drawing these vapours towards it, just as a great fire in a room draws the air towards it; so the sun having set these in motion, but not having strength enough to draw them into the middle region, to form them into a cloud, doth yet draw them till he is below our horizon; then these dews tend to the earth from whence they were taken, and in their motion to the west do fall on that ground which hangs eastward, at right angles; therefore offensive to them most. Cook, fo. 8.—This seems to hold in corn land also.

Of side-lands.

§. 11. The side-lands in the hill country are always the poorest, because the good grete, or mold, is washed down by rain.

Of head-lands.

I was observing the great difference between the lower head-land of my wheat and the other parts, the head-land being much the best wheat: this must be occasioned by the horses much treading on the turns, whereby the head-land was laid so close, that it kept in the moisture better than the lighter parts, which soon burnt up.

I observe the head-lands of all corn are first out in ear, not only on account of their being generally better in heart, but because, lying under the hedge, the corn lies warmer.

Of light moldering land.

§. 12. Light land is said to be the best and kindliest land for corn, whilst it will hold it, and that may be for three years; but strong clay-land, though it will bring the less crops, will hold it longest, and endure ploughing possibly for six or seven years.

We have in the hill-country of Hampshire a light moldering ground, especially on the side-lands, which the countrymen think not fit to plough up for a wheaten crop till it has laid still five or six years,

years, and got a sword, but will then plough it to a barley and wheaten crop: the very life of these grounds, when sowed, consists in holding the seed fast together, which girt it cannot have, being moldering, without a sword; therefore they are out who will sow it beyond a wheaten crop (which is sowed on one earth) the ground after a wheaten crop being too loose; I hold it best therefore to lay it down upon the wheaten crop, sowing rye-grass with it, which will not only grow up with the wheat, and keep the top of the ground firm against moldering in summer and winter, but by the strength of the fold on the wheat will give good burthens of grass till to be ploughed to wheat again. — The best husbandry for all light barren ground seems to be, to sow it to rye-grass, and so to plough it up to corn once in four or five years, and sow it again on the first crop to rye-grass. Such ground is to be valued only on account of it's grass, but, if sowed to hop-clover, it will not at every two years end be strong enough to carry corn.

§. 13. ^a Cato, in the situation of a farm, advises Situation
of a farm. his countrymen to choose a southern aspect; of so great consequence was the nearer neighbourhood of the sun even in those hot countries, and therefore not to be despised in these colder; for it is plain to me, that the corpuscular bodies of the sun injected not only into our bodies, but into all vegetables by it's heat, are in their influences prodigiously more powerful towards fructifying all sorts of plants, than any other manner of heat, or other rich manures whatsoever; for soot, nitre, ashes, blood, artificial salts, or other mangonisms and compositions Glau-

^a Cato scripsit, optimum agrum esse, qui sub radice montis situs sit, et spectet ad meridianam cœli partem. Varro, fol. 1. — In meridiem spectet. Cato, fol. 1.

ber has made, though they may perform wonders in our cold countries, yet cannot produce above a fifth part of the increase the earth shall do, without these arts, in those countries nearer the sun, as Africa, and the West-Indies. And the heat of the sun is, I doubt not, so corporeal a body, as to have fixed in the earth of those countries it's minutest particles so far, that, if we were to bring from thence a bushel or two of their earth, it would for some time do wonders in our cold country, till the treasures, the sun had by it's activity injected, were exhausted; and according to the above notion is the great benefit of summer-fallowing to be accounted for: the often turning the earth in the summer grinds it into small mellow parts, each of which receives those subtle luminous emanations of the sun in a more abundant manner, when it's parts are so loosened by the plough and spade. And I doubt not but in the hot climes, in their rainy or wintry seasons, by reason of the richness of the soil, made so by the corpuscles of the sun so plentifully injected, that the trees strike roots much deeper than with us, and that corn does so also, though possibly the straw may not exceed the length of ours, because the sun checks it's growth, and confirms the fibres and stalks of the leaves too fast.

A field of mine has a hedge-row to the south-west, on a rising ground; this hedge-row keeps off the sun from it a great part of the day; it is a very good clay piece of land, through which the whole flock of sheep pass as often as they move from one ground to the other; the corn here runs much into halm, to shew the land is good, but produces a very thin grain: and the same proportion does a farm hold with this land, which lies shelving from the sun to the north; for the same reason all headlands fenced from the sun must be treated accordingly, and sweetened, not with dung, but chalk,

ashes,

thes, &c. and such land is to be concluded always
four : for the same reason such lands are easily over-
ploughed.

I have in the former observation taken notice of
the sun's checking the growth of straw, and con-
firming the fibres and leaves too fast, which is the
reason I have assigned, why the straw may not in
hot countries exceed the length of ours : this how-
ever may perhaps be no hindrance to the increase
of the grain ; for from what I have remarked of
this field, and also from other observations, I am
inclined to think Dr. Woodward's hypothesis not
improbable.—The vegetative particles of the earth,
which are particularly adapted for nourishing the
seed of a plant, may possibly consist of a much more
subtilized body than the other particles of earth,
that nourish the straw, leaves, &c. and this body
may require longer time to be so rarified, concoct-
ed, and digested, probably by the sun and air work-
ing on it, that by such means it may be assimilated ;
for dung laid on very barren ground does not, by
experience, consist of abundance of these refined
particles, and may therefore produce abundance of
straw, in our cold climate, but not of corn.—If
this be the case, it seems probable also, that in every
plant, among the innumerable tubes, which pass
thro' the stalk (supposing of wheat) to the ear, some
peculiar tubes or fibres may be appointed by the
All-wise Creator, which run from the root upwards
to the summit, and are much finer and straiter than
the other tubes of the plant, for receiving and con-
veying to the seed the similar and seminal parts and
juices ; consequently, where earth does not abound
in these parts, poverty ariseth in the increase, tho'
the earth may abound in the more gross vegetative
parts, allotted for nourishing the stalk. From
hence it may be, that after one crop of peas you may
have the next crop of peas full in halm or straw,

but never in kids ; from hence we find, that often stirring the earth, subtilizing it's parts, and turning it up to the air and sun, is exceedingly conducive to the multiplying of grain, tho' the length of straw may not be much increased by it : this may probably give a reason why ashes, soot, &c. may have such copious vegetative particles in them, as to force so strongly the growth of plants ; for the fire having separated and loosed the heterogeneous parts, which clogged each other, the vegetative particles are thereby enabled to be more active, and, being reduced into their minuter corpuscles, do ascend in greater numbers up the tubes of plants. Nor is it to be objected, that by fire these vegetative particles should be destroyed, seeing they are supposed to be solids. The proper alimantal juices being thus prepared by nature, and the different tubes being fitted to receive them, vegetation appears to be performed in plants no otherwise than by the rising of juices up the tubes by the heat of the sun, in the same order and manner as the dissimilar juices and spirits rise in an alembic ; the orifices of the tubes, conducting either to the straw or seed, being fitted to receive the juices appropriated to either. This order is however sometimes interrupted.

Of change
of species.

* The common opinion, maintained by Mr. Evelyn and others, is, that every plant exhausts it's own proper nutriment leaving that which is appropriated to the other plants quiet and undisturbed. Dr. Woodward not only subscribes to this notion, but adds, That there are very many and different ingredients to go to the composition of the same individual plant, of which ingredients every part of the plant has one allotted to it for it's separate and peculiar use. Our author, though he asserts nothing, yet, in this supposition, that the straw and seed may be nourished by different kinds of juices, received at different orifices, and conveyed from the root upwards by different tubes, seems not to dissent from Dr. Woodward's opinion. The doctor reasons from the vast variety of tastes, smells, colours, forms, and solidness, that it is impossible one homogeneous matter

rupted, by reason that the atoms of heterogeneous juices will sometimes shoot themselves up in different angular stirias from what are adapted to the orifices of the tubes ; whereas in an alembic, where the passage of rising is free, the apothecary can call for the order he knows his spirits will rise in.—

What

matter of the same substance, constitution, magnitude, figure, and gravity, should make up all this variety ; and concludes, that there want not good indications, that every kind of vegetable requires a peculiar and specific matter for it's formation and nourishment ; Yea, saith he, each part of the same vegetable doth so. The former part of this conclusion is assigned by the doctor as the cause of the necessity of frequently changing the species of vegetables. But Mr. Tull, in his 14th chapter of Horse-hoeing husbandry, treats the doctor's arguments with great contempt, and in contradiction to them advances the three following propositions,

1. *That plants of the most different nature feed on the same sort of food ;*
2. *That there is no plant but what must rob any other plant within it's reach ;*
3. *That a soil which is proper for one sort of vegetables once,*

IN RESPECT TO THE SORT OF FOOD IT GIVES, *proper to it always ;*
And concludes, that if any one of the propositions are true, there is no need to change the species of vegetables from one year to another, IN RESPECT TO THE DIFFERENT FOOD THE SAME SOIL IS, THOUGH FALSLY, SUPPOSED TO YIELD.

In support of these propositions he argues, that, if in this series of crops each sort were so just as to take only such particles as are particularly proper to it, letting all the rest alone to the other sorts to which they belonged, then it would be equal to them all which of the sorts were sown first or last. But let the wheat be sown after the barley, peas, and oats, instead of being sown before them, and then it would evidently appear, by the starved crop of wheat, either that some or all of those other grains had violated this natural probity, or else that nature has given to vegetables no such law of meum and tuum. Again, if all plants did not feed on the same sort of food, they could not rob one another, as they are allowed to do ; a charlock could not rob a turnip, and starve it more than several turnips can do, unless the charlock did take from it the same particles which would nourish a turnip, and unless the charlock

What these alimental juices consist of, it is not easy to say : Sir John Floyer, in his Touchstone of Medicines, is of opinion, that plants only spread their roots in the common earth, but draw their nutriment from the rain water, impregnated with the sulphureous acid of the air ; but Dr. Woodward

did devour a greater quantity of that nourishment than several turnips could take. Flax, oats, and poppy, could not burn or waste the soil, and make it less able to produce succeeding crops of different species, unless they did exhaust the same particles which would have nourished plants of different species ; for, let the quantity of particles these burners take be never so great, the following crops would not miss them, or suffer any damage by the want or loss of them, were they not the same particles, which would have nourished those crops, if the burners had left them behind, quiet and undisturbed. Neither could weeds be any prejudice to corn, if they did draw off those particles only that suit the bodies of weeds ; but constant experience shews, that all sorts of weeds, more or less, diminish the crop of corn. These are his principal arguments, and as a confirmation of the fact, that plants of the most different nature feed on the same sort of food, he produces this experiment. At the proper season, tap a birch-tree in the body or boughs, and you may have thence a large quantity of clear liquor, very little altered from water ; and you may see, that every other species of plants, that will grow in water, will receive this, live and grow in it as well as in common water. Having thus given his objections to Dr. Woodward's hypothesis, concerning the cause of the necessity of frequently changing the species of plants, he proceeds to propose his own. One true cause of a crop's failing, saith he, is want of a quantity of food to maintain the quantity of vegetables which the food should nourish. When the quantity of food is sufficient for another species (that requires less) but not for that which last grew, to grow again the next year, then that other is beneficial to be planted after it ; for the constitution of plants are different ; some require more food than others, and some are of a stronger make, and better able to penetrate the earth, and forage for themselves. Therefore oats may succeed a crop of wheat on strong land, with once ploughing, when barley will not, because barley is not so well able to penetrate, as oats, or beans, or peas are. Long tap-rooted plants will not succeed immediately after those of their own or any other species of long tap-roots, so well as after horizontal-rooted

ward by many experiments has confuted this, and the like opinions delivered by other authors, and sufficiently proved, that the watery part imbibed, and running up the tubes, is only the vehicle to a certain vegetable terrestrial matter, which gives nourishment and increase to plants. These minute,

rooted plants; but horizontal will succeed those tap-roots as well or better than they will succeed horizontal; for the food at a greater depth has already been exhausted by the one, and chiefly that which lies nearer the surface by the other. The reader must observe here, that these causes, to which Mr. Tull imputes the necessity of changing the species of plants, are causes only in the common way of husbandry; for by his new method of constant tillage, he tells us, he prevents their effects. For example, wheat is not, in the common way, (especially on any strong soil) to be sown immediately after wheat; for the first wheat standing almost a year on the ground, by which the ground must grow harder, and wheat seed-time being soon after harvest in England, there is not space of time to till the land, after having been thus exhausted, so much as a second crop of wheat requires; but wheat, in his new method, may be sown immediately after wheat; for by keeping the ground in constant tillage he procures a sufficient quantity of food for his plants, and strengthens their constitutions: if ground therefore be managed according to the rules prescribed in his book, he asserts, there is no necessity of ever changing the species. I think it may be objected to this assertion of Mr. Tull's, that it is not only the farmer but the gardener also who complains, that his ground is grown tired of such and such a plant; and finds himself under a necessity of changing it for another species; and yet in his hands the hough and the spade are in constant use, and he is perpetually manuring, turning, and pulverizing his ground; and, if what Mr. Lisle has taken notice of be fact, that after one crop of peas you may have the next crop of peas full in halm or straw, but never in kids, it seems to follow that the seed and the straw require different juices for their nourishment. See article Peas, title, Land sowed to peas will not bear peas well again for six years, §. 12. also §. 11. Upon the whole however, which of these two gentlemen is in the right, or whether either of them is so, I must leave to the determination of those who have busied themselves in these inquiries.

☞ Of the order in which the species should be changed, see the author's remarks at the end of the article Sowing.

MANURE and MANURING.

atomical, imperceptible bodies arise up thro' these watery tubes with wonderful swiftness, according to the rules of levity and gravity, by how much their atomical parts are lighter than the water, or have a figure serviceable to that speed; and the water thrusting still forwards at the extremity, these minute parts are forced to the side of the tube or pipe, and every minute part helps to the increasing and lengthening it.

MANURE and MANURING.

Mr. Evelyn's catalogue of manures. Of nitrous salts.

§. 1. **M**R. Evelyn has given us an account of the various manures, either experienced by himself, or in use in his time, or of which he had conceived a good opinion; of these I shall present the reader with the following abstract. Amongst his composts, he says, cold and dry winters, with store of snow, is one which I reckon equal to the richest manures, being impregnated, as they are, with celestial nitre. fo. 312.

'Tis salts, which entice roots to affect the upper, and saline surface of the earth, upon which the nitrous rains and dews descend, and are the cause that some plants the most racy, and more charged with juice than any other, such as the vine, thrive so well amongst rocks and pumices, and in what ever maintains this vital pickle. fo. 312.

'Tis salt which makes all covered and long shaded earths abound in fertility, ib. — Observe therefore, how under corn and hay-reeks corn grows; but yet it seems in meads, grass comes not up well under hay-reeks, because possibly the ground may be too rich, or salt, for perennial grass, tho' not for annual corn.

Salt sown in gravel-walks (as I have experienced it) for a time burns the earth, so that nothing will grow

grow upon it; but when the rains have once diluted it, it springs up more wantonly than ever; for which I have left it off. fo. 314.

He has a wonderful opinion of nitre. fo. 315.— But, for ought I find, he is strangely confounded about the principles of vegetation, what they are.

§. 2. Woad and hemp are said to destroy the vegetable virtue where they grow. fo. 316. Woad and hemp.

§. 3. He is against the use of human dung, unless it be well ventilated and aired, notwithstanding Columella. fo. 317. Human dung.

§. 4. Aquatick fowls dung is too fiery, and therefore not to be laid on ground, till the volatile salts have their mordicant and piercing spirits qualified. ib. Dung of water-fowl.

§. 5. If gravel be wet and cold, lime is preferable. fo. 304. Manures for different soils.

§. 6 Arenous and sandy earths want ligature; and besides, consisting of sharp and asperous angles, wound and gall, curl and dwarf our plants, without extraordinary help to render the passages more slippery and easy; therefore relenting chalks, with calcinations of turf, are profitable. fo. 305. Gravel. Sand.

§. 7. Sand, being of an open and loose texture, is apt to put forth a forward spring, as more easily admitting the solar rays, but it does not continue; this is an infirmity which may be remedied with loam, which unites it closer. ib.

§. 8. With a hungry, or weeping, or cold sort of clay, lime is not to be mixt, which being slack'd is raw and cold. fo. 307.— To these laxatives are best, such as drift sand, small gritty gravel, sawdust with marl, or chalk, and continual turning it with the spade and plough. fo. 307. Cold clay.

Chalk is healing, and therefore proper for clay, cold, and spewing grounds.

§. 9. Scouring of pond, or ditch-earth, is a most excellent manure for light land. fo. 309. Pond mud.

MANURE and MANURING.

Swine's-
dung.

§. 10. Lands that are hot and burning allay with swine's-dung, or neats-dung. fo. 309.

Horse-
dung.

§. 11. Horse-dung, the least pinguid and fat of any, taken as it falls, being the most fiery, excites to sudden fermentation above any; wherefore 'tis then fit only for the hot-bed: but for fields it had need be well rotten, lest it bring a couch, and pernicious weeds; the seeds of hay and other plants of which the horses eat, come oftentimes entire from them: such vegetables do commonly spring up from the soil of cattle, of which they chiefly eat, as long knot-grass from horse-dung; short, clean, and sweet pasture, from the dung of sheep and cows the sonchus or sow-thistle from swine. fo. 317.

Neats-
dung.

§. 12. Neats-dung universally of all others is most harmless, and the most useful; excellent to mix with sandy and hot grounds, lean, or dry. fo. 318.

Sheep's-
dung.

§. 13. Sheep's-dung is of a middle temper between cows-dung and pigeons-dung; profitable in cold grounds. fo. 318.

Pigeons-
dung.

§. 14. Pigeons-dung and that of poultry is full of volatile salts, hot and fiery, and therefore most applicable to the coldest ground. Be this observed as a constant rule, that the hotter composts be early and thinly spread, and contrary the colder. fo. 318.—Very efficacious is this dung to keep frost out of the earth. ib.—As the effect of this dung is sudden, so it lasts not long, and therefore must be the oftener renewed. fo. 319.

Blood.

§. 15. Blood is excellent with any soil where fruit is planted; and, as to it's improvements of corn-land, he tells you a strange story of the battle in Badnam fields in Devonshire. fo. 319.

After the battle of Badnam fields in Devonshire, says he, where Lord Hopton had a signal victory, the blood of the slain did so fertilize the ground, that most of the wheat stalks bore 2, 3, 4

yea

yea to 7, and some to 14 ears; a thing almost incredible, but assuredly reported by diverse eye-witnesses. fo. 319—I have given my opinion of this and the like tales under the article, Corn in general—see—Of many ears on one stalk.—He adds, that the blood and flesh of animals is much more powerful for the enriching of land than their dung and excrements, and is computed at twenty times the advantage, and to the same advance above this is hair and calcined bones; and so the dung of pigeons and poultry feeding on corn does as much exceed that of beasts, which feed on gross vegetables, and one load of seed contains as much virtue as ten load of dung.

§. 16. Wood-ashes are fit for wet ground: in the East-Indies, burning trees to ashes is the only improvement, of which they strew not above a bushel to an acre; it likewise kills the worms; but in ground that is subject to over-heat and chap much, ashes and burning composts do but increase the fever, and therefore contrary remedies should be sought, such as neats and swine's-dung; but not so, when lands are naturally or accidentally cold. fo. 320.

§. 17. He disapproves of laying dung in heaps in the field, exposed to the sun, rain, and drying winds, whereby all the spirit and strength is carried away; and pretends to put us in a better method of managing our dunghills.—Let the bottom or sides of a pit, says he, be about four feet deep, paved so with small chalk or clay at the bottom, that it may hold water like a cistern; direct your channels and gutters about your house and stables to it. The pit must be under covert, so that the down-right rains at least may not fall into it. Lay a bed of dung in it a foot thick, on that a bed of fine mold, on that another bed of cyder-mere, rotten fruit,

Dung should not lay exposed to the sun and air.

MANURE and MANURING.

fruit, and garden offal, on this a couch of pigeons and poultry-dung, with more litter, and beds of all other variety of soil; upon all this cast water plentifully from time to time: as for fresh dung, such as sheep make when folded, 'tis good to cover it with mold as soon as possible from the sun. fo. 326.

Manures
used by
the an-
cients.

§. 18. He accounts the warmth of the woolly fleeces of sheep an improvement to land as well as their dung. fo. 308; and the very breath and treading of cattle, and their warm bodies, is comfortable, and marvellously cherishing. ib.—Thus far Mr. Evelyn.—There is no great matter to be collected from the ancient writers on husbandry in respect to this article of Manuring. ^f Pliny prefers cow-dung to horse-dung; and, if the cows, or cattle that chew the cud, feed on as good meat as horses, without doubt the dung, by reason of such chewing, will be the finer. ^g Columella gives a like reason for preferring asses dung to that of any other beast; because, says he, the ass is a long time in grinding his meat, by which means it is more thoroughly digested, and fit to be laid on the ground immediately, as soon as made. Hogs dung he esteems the worst of all.—^h Varro and Pamphilus agree, that the dung of geese, and all aquatick fowls, is of a bad kind; but the latter of these assigns a different cause for it from that given by our English writer: he attributes it only to it's too

^f Inter fimos bovum præfertur antequam jumentorum. Plin. lib. 17. c. 9.

^g Inter pecudum stercus optimum existimatur quod asinus facit, quandoquidem id animal lentissimè mandit, ideòque facilius conquoquit, et benè confectum aque idoneum protinus arvisimum reddit. Deterrimum ex omnibus suillum habetur. Columella, lib. 2. c. 14.

^h Malum est stercus anserum, et aquaticarum volucrum, propter humiditatem. Pamphilus in Geoponicis, fol. 5.

great

great humidity, whereas Mr. Evelyn reports it to be of a fiery quality. —ⁱ Columella joins with ^k Varro in giving great commendations to pigeons-dung, beyond that of all other birds, on account of its fermenting heat, and in advising to sow it on the ground before the corn is harrowed-in ; but, if this is not to be procured, he directs us to make use of goats-dung in its stead. ^l Pliny recommends earth that is salt, as preventive of, or destructive to insects ; and this may be one of the great advantages from lime, foot, pigeons-dung, and often tilling the ground : ^m It is agreed on, says he, by every one, that there is no manure more profitable than lupines, ploughed into the ground before they have kidded.

§. 19. The maintenance corn must depend on, is the innate digested salts of the earth, and well concocted juices, which are not to be obtained by the præcocious way, the same year the land is dunged ; dunging is but a weak support for very poor land to depend on ; 'tis a good sauce to the noble juices, which are before in the land, to heighten them: but if you think dung alone a sufficient nourishment, where the land is before poor, you will find, that in such case the corn will run out

Dung, its
insuffi-
ciency to
poor land.

ⁱ Antequam farrias, more seminantis, ex aviariis pulverem stercoris per segetem sparge ; si et is non erit, caprinum manu jacere, atque ita terram sarculis permiscere, ea res lætas segetes reddit. Columella, lib. 2. fol. 108.

^k Stercus optimum est volucrum, præter palustrium et nantium ; de hisce præstare columbinum, quod sit calidissimum, et fermentare possit terram : id ut semen aspergi in agro oportere. Varro, lib. 1. sect. 43.

^l Salsæ terræ multo melius creduntur, tutiora a vitiis innascentium animalium.

^m Inter omnes constat nihil esse utilius lupini segete, priusquam siliqueetur, aratro vel bidentibus versa. Plin. lib. 17. c. 9.

☞ Mr. Miller remarks, that in Italy, to this day, they cut down the narrow-leaved tall blue lupines, when in flower, and plough them into their ground as manure.

to

to a straw, and the grain to a thin body with little flour; and that very poor land shall be as little able to bear good dunging, as a poor man, whose blood is poor, much strong drink: the very quintessence in earth, which improves grain, seems to depend very much on the air, sun, and rains, incorporated with the earth, which seem principally to give birth and life to vegetables; for the receiving of which principles the dung has not had time, which is newly deposited on the earth: how much is to be attributed to these principles is easy to be seen, if Mr. Ray, Grew, and Malpigi be consulted.

Dung of
cattle good
in propor-
tion to the
goodness
of their
food.

§. 20. In discourse with farmer Sartain of Broughton in Wilts, and other farmers, I was saying, that the tails and the improvement of the dung of cattle was answerable to the food they feed on, and gave several instances of it; to which farmer Sartain replied, They were sensible also, that, when they foddered with the best meadow-hay, it made their grounds quite another thing in goodness, than when they foddered with a coarser hay. — Farmer Stephens of Pomeroy assented to this, and added, that the sheep slate in the common of Pomeroy was of so rowety or roweny, wet, and poor a grass, that the tails of the sheep that feed on it would do land no good: to confirm his report, he led me to a good healthy ground, which he had sowed to wheat, and which he had folded with these sheep, so rich in appearance, that no ground could be seen for the trundles, and yet by the corn there was no sign of the good effects it had on the land; and the trundles, if you broke them, were as coarse as rabbit-dung. This makes therefore for the improvements by grass-seeds in poor lands, forasmuch as the sheep gain not thereby a good belly-full only, but also their dung has greater virtue.

Of dung-
ing poor
land next
a hedge.

§. 21. If you divide the poorer part of a ground from the better, leave two or three lugg in depth of

of the poorer ground within the hedge of the better ground ; because the cattle love to creep to the hedge-side, and will improve that poorer part by their dunging on it.

§. 22. That part of my barley, which had been dunged with horse-dung the year before for wheat, was twice as good as that part, which the same year was dunged with cow-dung, though that part dunged with cow-dung was rather the better land. Horse-dung preferable to cow-dung.

§. 23. Horse-dung being laid on wheat-land just before it is sowed, and then ploughed in, and sowed on one earth, (which is often done in the hill-country, where the land is light) is apt through the fire of the dung to run out the corn faster than the digestion of the stalk can be made ; and so the parts being loose and hollow in the texture, when the winter comes, the cold pierces it so, that it withers and dies ; whereas dung should either, on such land, be laid and spread a month before the ground is ploughed and sowed, or else should be ploughed in a fortnight before the ground is sowed. Horse-dung when to lay it on.

§. 24. Lord Shaftsbury complained to me, that he did not find feeding his grounds with cows improved them. I told his lordship the reason I believed was, because his cows were milch cows, not fatting beasts ; for the dung of milch cattle cannot improve lands like the dung of fatting beasts, the milking them solliciting the fat and nourishment of the creature to follow the current of the milk, whereby the dung is much the poorer ; and why weather-fold is worse than ewe-fold, I conceive to be, because the nourishment of the weather goes into his growth. Dung of fatting beasts preferable to that of milch cows.

§. 25. I asked a Wiltshire man what the tails of a hundred sheep might be worth, if one was to hire them. He said, that sometimes he had known sheep to be let out, and they have had 12 d. per night for lending a hundred sheep to fold, which is looked Of hiring sheep for their dung.

looked on of as good a value as a good load of pot-dung. Note, in Leicestershire one may have the fold of 200 for 12 d. per night.

Ewes dung
preferable
to that of
weathers.

§ 26. Mr Davers of Causum in Wiltshire assures me, that notable countrymen have told him, that in dividing the ewes from the weathers, in folding in the same ground, they have had much the better corn where they have folded the ewes. Mr. Davers thought it was from the lambs, because their dung must be richer from the milk they sucked from the ewes. I have given my sentiments on this point in a former observation; but quære whether the soil of all gelt creatures, is not less generous and rich than that of others. I told Mr. Davers, that I had been assured, if cattle had poor mean hay given them, the soil of them would do the ground little service, to which he assented; and he said further, that horses dung when they were at grass rather impoverished than bettered the land, whereas what came out of the stable was otherwise.

Time of
carrying
out some
sorts of ma-
nure.
Malt-dust
mixed with
pigeons-
dung.

§ 27. Carry out horse-piss, cows-piss, hogs-piss, when they are frozen and in ice.

Many husbandmen sling layers of malt-dust into the pigeon-houses, and, when it is well covered, sling another layer, and sow it mixed thus together on their grounds, and find, they say, great advantage in it. I have not as yet had experience of it, but have heard it greatly commended, and believe it to be a good way.

Cautions
in using
pigeon and
poultry-
dung.

§ 28. Sharrock says, fo. 91. For cold land, pigeon and poultry-dung^a is very useful, which

^a Mr. Miller says, the dung of pigeons, hens, and geese are great improvers of meadow or corn-land; the first of these being the best superficial improvement that can be laid on meadow or corn-land: but, before it is used, it ought to have lain abroad out of the dove-house some time, that the air may have a little sweetened it, and mollified the fiery heat that is in this dung.

abound

abound in volatile salt; these are only sowed by the hand, for fear of burning the corn in the chitting of the grain. — I have observed where these dungs have been over-plentifully laid, that the place bore no corn at all, whereas in other places, where it was moderately strewed, the crop was exceeding great; the same effect there is in urine and soot, from the very eager spirit, and volatile salt, and therefore the same caution is to be had in their use: horse-dung, if not rotten, lying thick will do the same.

§. 29. Mr. Putching of Leicestershire says, they commonly sow two quarters of pigeons-dung on an acre (which is sixteen bushels) and their method of sowing it is, to sow it after the corn, and before the corn is harrowed in: in meadows he supposes eight bushels on an acre is enough.

Quantity of
pigeons-
dung on an
acre.

§. 30. It may be judged that pigeons-dung is better than poultry-dung, from Mr. Evelyn's view of them by a microscope; for he says, that pigeons-dung is constituted of a stiff glutinous matter, easily reducible to a dust, of a grey colour, with some husky atoms after dilution; but the dung of poultry was so full of gravelly small stones and sand, that there appeared no other substance, save a very small portion both of white and blackish viscous matter, twisted up together, of all other the most fetid and ill-smelling. Evelyn, fo. 295.

Pigeons-
dung pre-
ferable to
poultry-
dung.

§. 31. Sir Ambrose Phillipps sells his pigeons-dung for 4 d. per bushel, which is 2 s. 8 d. per quarter; one Gimson bought it, and laid it on light sandy land, and, it proving a hot summer, he thought it did his barley rather harm than good. Mr. Putching is very fond of this dung, and buys it for 2 s. 6 d. per quarter, and sows two quarters, and sometimes three on an acre, which he thinks is best: he sows it after his barley is in the ground, before

Pigeons-
dung, price
and manner
of sowing
it.

before harrowing, and harrows in both together: he also sows it in the same manner on his wheat-land, and in case a wet and cold spring comes upon his barley, so that he is like to have little in his furrows, he flings about a sack on an acre, between the furrows, and finds it to strengthen and comfort the cold land so, that he has as good corn there as on the ridges: he bad me but try, and I should have as good an opinion of it as he had. Mr. Clerk of Ditchly told me afterwards, that Sir Ambrose sowed commonly five quarters on an acre.

To manage
pigeons-
dung.

§. 32. The gentlemen mentioned in the preceding observation agreed, that the best way to manage pigeons-dung in a dove-house, was often to lay a layer of straw upon it; but then it will be amassed to so great a bulk, that it must often be removed to some place, where it may lie from the power of the weather.

Soot and
pigeons-
dung.

§. 33. Sharrock tells us, fo. 134. Soot and pigeons-dung abound much in volatile salt; and I have this year (1703) on a cold and moist clay, seen excellent advantage on the grass thereby, it being only strewed thin on the grass before spring; but of the two soot was the best.

Soot to kill
moss.

§. 34. Cook says, fo. 19. Soot is good to kill moss; it's heat kills the roots, for they lie on the top of the earth.

Soot to lay
on green
wheat.

§. 35. I find in Leicestershire many do fling soot on their green wheat in February, so as to blacken the land with it; therefore I need not fear burning my wheat with it, at that time at Easton. The soot from the sea-coal is esteemed the best.

Coal ashes
good for
St. Foin.

§. 36. A notable farmer told me, that he had tried all ways of managing French-grass, by dung, and fold, &c. and had found coal-ashes the only, or best improvement. — Qu. therefore why not beak-land burnt; and why may not these be the best

est improvements, because they will not create and encourage a rowety or roweny grafs to arife, to shoak the French-grafs, as Mr. Methuen had observed dung to do.

It seems to me, that ashes may be properest to French-grafs, inasmuch as they kill the natural <sup>Id. the rea-
fon.</sup> grafs, from the same reason as the salt of brine does, or urine thrown on gravel-walks; and ashes have a strong salt in them; yet this salt is beneficial to the roots of the French-grafs, because it has a tap-root, which runs deep, and the salt of the ashes is very well qualified before it sinks down to the roots of the French-grafs.

§. 37. J. Mortimer, Esq; F. R. S. fo. 380. ^{Rotten} reckons rotten wood of hedges and coppices to be a ^{wood.} great improver of the soil where it drops, and instances the earth where faggot-piles have been used to stand.

§. 38. Quinteny says, the dung of leaves ^{Rotten} thoroughly rotten, is hardly fit for any thing but to ^{leaves.} be thrown over new-sown beds, to hinder the rains, or waterings, from beating too much on the surface, and so hinder the seeds from rising; — and no doubt 'tis the same with corn. Part 1. fo. 5.

§. 39. Martin of the Western isles says, the manuring with sea-ware is an universal husbandry <sup>Sea ware
and marle.</sup> throughout those islands, fo. 53. &c. In the isle of Altig, he reports, that, by manuring healthy ground with sea-ware, many stalks had five ears growing on them; fo. 140; and in the isle of Skie, by an improvement of marle, 35 fold increase was had, and many stalks carried five ears of barley; and he assures us this account was given him by the then possessor of the land; fo. 132. ° But I have in another place given my opinion, that these superfætations are not probable.

° Vid. Corn in general.

Malt-dust.

§. 40. King of Ilfley in Berkshire says, that the malt-dust sowed on barley-land did very little good last summer (anno 1699) by reason of the drought; for, no rain falling from sowing-time till the seed was come up, the strength of the dust was not washed into the land.

He said, it was common in those parts of Berkshire, to lay malt-dust on wheat land, and to fling it on at the same time they sow the wheat, and harrow it in together, and a very good improvement it was; but, said he withal, I have heard husbandmen argue that point, and hold, that malt-dust is better for summer-corn than for wheat, and they give this reason for it; the winter corn lies a whole year in the ground, and the malt-dust will have spent it's strength by the time the winter is over, and not hold up the corn in heart all the summer; they sow with the wheat two quarters of malt-dust to an acre, which makes four quarters of corn-measure.

Farmer Ratty assured me, that malt-dust went beyond dung on clay-land; for 'tis on such land, not on light land, that he has had the experience of it: and that farmer Hawkins knows this very well, tho' he does not care others should, lest the price should grow dearer: he says, he lays twenty sacks on an acre, of the ordinary four-bushel sacks, which he buys at Whitchurch at 1 s. per sack. He sows on his wheat ground, not dung'd nor folded, about February, and he says the wheat will surpass the dunged-wheat, and the ground will produce a good barley-crop afterwards, tho' supposed to the contrary.

Mr. Thomson of Loughborough assures me, that malt-dust laid on cold grass-grounds makes a great improvement: he says, he lays after the rate of four quarters on an acre, on such ground, but 'twould be better to lay six or seven. Note, five quarters on an acre is a peck on a lugg-square; 7

quarters

MANURE and MANURING.

51

quarters is a peck and an half. It seems it would be agreeable on our cold clay-meadows.

I have observed of dungs, and lime, and strong beer, that they afford no spirits, or vegetable salts, till they have passed a fermentation by fire, whereby their spirits or salts are raised and secreted; so I look on the same observation to hold good in malt and barley; ground barley being of little profit to land if laid on it; whereas ground-malt laid on land, (tho' 'twould be madness to do it) as we may judge by the malt-dust, would yield a great produce.

Mr. Clerk says, he uses the kiln-dust of the malt himself, viz. that dust which comes through the hair-cloth, which he looks on to be better than the other: he laid (he said) ten quarters upon an acre, both on his grass-ground and barley, about January or February. I asked him if it would not be apt to burn the ground, not being laid on earlier; he said, one shower of rain he thought waih'd the heat out of it. As to the largest tail-dust of the malt, he sold it for 4 d. per bushel, to people to feed pigs with.

§. 43. In discourse with King on the subject of ^{Woollen} woollen rags, he assured me of strange effects from ^{rags.} them, which improve to four or five crops. He said they might be bought at London for 2s. or 2s. and 6 d. per hundred weight, 112 lb. to the hundred; old people might be hired to cut them on a block, which would cost about 6 d. per hundred. Lay of these chopt small, to an inch or two square; sow them by scattering them out of the seed-lip at the second ploughing or earth, about the latter end of July: being thus covered, they will grow finnowy or moldy by seed-time^p.

§. 44. It

^p Beside the manures spoken of by our author, there are two others much commended by Mr. Miller, which are rotten tanners bark, and rotten vegetables.---Oak bark, says he, after the tanners have

Worms
good for
drawing
long dung
into the
ground.

§. 44. It is a common and well approved of method in husbandry, at Litchfield in Hampshire, and the neighbourhood thereof, to carry out long dung, and lay it on lay-ground, that is light and whitish, and to let the worms draw it in, being laid early; then to plough it up and sow it on one earth; but it must not be strong land, because that can't be sowed on one earth.

Dung,
time of lay-
ing it on.

§. 45. It is a frequent practice in the hill-country to pot-dung land, run to grass and to a sword, in July, and to plough in the dung, and sow it on one earth with wheat, the latter end of August, or a week in September; and true it is, that though the ground be grassy and swordy, as it will be in our hill-country by two years lying to grass, and tho' the spring be very dry, as also the summer, yet in April and May,

used it for tanning of leather, when laid in a heap, and rotted, is an excellent manure, especially for stiff cold land; in which one load of this manure will improve the ground more, and last longer, than two loads of the richest dungs. It is better for cold strong land than for light hot ground, because it is of a warm nature, and will loosen and separate the earth: so that where this manure has been used three or four times, it hath made the land very loose, which before was strong, and not easy to be wrought. When this manure is laid on grass, it should be done soon after Michaelmas, that the winter rains may wash it into the ground; for, if it is laid on in the spring, it will burn the grass, and, instead of improving it, will greatly injure it for that season. Where it is used for corn land, it should be spread on the surface before the last ploughing, that it may be turned down for the fibres of the corn to reach it in the spring, for, if it lies too near the surface, it will forward the growth of corn in winter; but in the spring, when the nourishment is chiefly wanted to encourage the stems, it will be nearly consumed, and the corn will receive little advantage from it.—Rotten vegetables of most sorts also greatly enrich land; so that, where other manure is scarce, these may be used with great success. The weeds of ponds, lakes, or ditches, being dragged out before they seed, and laid in heaps to rot, will make excellent manure, as will most other sorts of weeds. But wherever any of these are employed, they should be cut down as soon as they begin to flower.

May, when the sun gets strength, and warms the ground, the spirits of the dung will be drawn out of the ground upwards, as will plainly appear by the good deep colour of the wheat, and the thickness and thriving condition of it: however 'tis plain by several experiments I have made this way, that the mellow and looser the ground is, you thus manage, the better the spirits of the dung will be drawn upwards, through the earth, to the roots of the corn, as has appeared to me, both by the thickness and colour; therefore the husbanding land this way, which is run to a matted sword, ought, as much as can be, to be avoided. Corn thus husbanded will thrive very little during the winter, nor until warm weather comes: from hence it may seem, that to carry out dung on such land the beginning of June, and plough it in whilst the sun is hot, and has a good

for, if they are suffered to stand until their seeds are ripe, the land will be stored with weeds, which cannot be destroyed in two or three years; nay, some kinds of weeds, if they are permitted to stand so long as to form their seed, will perfect them after they are cut down, which may be equally prejudicial to the land: therefore the surest method is to cut them down just as they begin to flower; at which time most sorts of vegetables are in their greatest vigour, being then stronger, and fuller of juice, than when their seeds are farther advanced; so that at that time they abound most with salts, and therefore are more proper for the intended purpose. In rotting these vegetables it will be proper to mix some earth, mud, or any other such like substance with them, to prevent their taking fire in their fermentation; which they are very subject to, where they are laid in large heaps, without any other mixture to prevent it; and it will be proper to cover the heaps over with earth, mud, or dung, to detain the salts; otherwise many of the finer particles will evaporate in fermenting. When these vegetables are thoroughly rotted, they will form a solid mass, which will cut like butter, and be very full of oil, which will greatly enrich the land. — He commends likewise sea-sand, shells, and corals, especially for a strong loam, inclining to clay; but adds, as these bodies are hard, the improvement is not the first or second year, because they require time to pulverize them, before their salts can mix with the earth to impregnate it.

season to hold so, is better husbandry than to defer it till August; for the sun will exhale upwards the spirit of the dung. In poor ground it seems proper to me to summer-fallow it, (if lay-ground run to grass) and stir it in the winter, in order to sow it at spring with oats or barley and French-grass, in order to feed the French-grass with cows during the summer, after the roots are well established; and such feeding will not kill the French-grass in such poor ground; for there can be no danger of such exuberancy of sap, that the root should fall under a plethora: in autumn it may be fed a little with sheep without prejudice.

From the above observation, how the dung plough'd in under furrow is drawn up to the roots of the corn by the strength of the sun, may be explained, in the same manner, how grass in the hottest summers comes to have most goodness and spirit, as is experimentally proved by deer, sheep, and other cattle thriving by it (tho' plenty of rain does most contribute to increase of growth) the effluvia which lie deep, being so exhaled to the roots.

Mr. Biffy and Mr. Slade being with me, when in the month of July or August I was carrying out my dung to lay on land that was swordy, in order to spread it, and turn it under furrow, they did not approve of that husbandry; Mr. Slade said, he found it a much better way to carry it out in the spring, i. e. about May, to lay on ground not apt to run to grass, and let it be wash'd in, which will mellow the ground, and hollow it; and then turn it in at Midsummer, and sow it on one earth. Mr. Biffy said, he found it always the best way, if dung was free from weeds, and short, such as ox-dung and horse-dung that would spit, to carry it out on the ground plough'd up to sow on one earth, a little before you sow it, and drag it in: he said, he always found the best corn by such husbandry, and would have persuaded me to try it.

§. 46. It seems to me, that the grounds near the house ought to have the dung, in regard of the cheapness of carriage, and in regard that three loads of corn may be carried in from thence, instead of one from a farther distance; and if such grounds consequently by rich crops of grass-seeds maintain a treble stock, what matter is it whether the grounds at a distance have the dung at the first hand or second, I mean by the tails of sheep? Besides, the richer the grounds near to your backside are, the more they will answer in the produce of grass, and in being of more general conveniency, as in maintaining lambs at lambing-time, in fattening * hogs by broad-clover, in maintaining horses and mares with food, in bringing good goar-vetches, in the easy carting of a good burthen of grass-feed hay; and, if not folding, other methods may be used in manuring grounds at a distance, such as ploughing in goar-vetches, liming, rags, sowing to French-grass, watering, &c.—The farmers however argue from experience, that we must sometimes change our manure from the fold to pot-dung, and not always fold on the same land.

To lay
pot-dung
near home.

* Hog, or
young
sheep.

§. 47. They who are curious in sowing seed-corn, will not allow a load of corn or dung at harvest to come through their wheat-fallow.

§. 48. If dung lies near the corn-carting, and not carried out before harvest, so many sorts of corn will be littered in it, which will not have time to rot, that you must expect a crop foul with trumpery.

Dung
should not
lie near the
corn-cart-
ing.

§. 49. I hold it much the better way, if earth be carried out as a soil to land, not to spread the earth on the land till the last earth be given for the corn, and then to spread it, and harrow it in with the corn with new harrow tinings or drags; hereby the earth will not be buried.

Mold, to
lay it on.

§. 50. One of my labourers was going to turn the dung for me into heaps in the foddering barton;

Of turning
dung.

he asked me, if he should stir it all; he said, 'twas best to turn it all, and not lay the mixen he flung up on the top of the rest; for though 'twas something more charge, yet 'twould rot the better. Farmer Elton coming by, told me, I did well in it, for 'twas much the better way.

Straw, to
manage it
for dung.

§. 51. If straw, not half dung, be carried out into the fields, and laid in heaps, and after rains turned, it will become dung in good time.

Mr. Raymond of Puck-Shipton in Wiltshire visiting me, I told him, I intended to dig my farm-yard into holes, whereabouts the kine foddered, that in those holes I might let the wet into my dung, that it might rot the better. He immediately disapproved much of it, and said, that way the dung would never rot; for straw was like weed, and other things, which lying always wet would never rot; but that which would make straw rot was to let it lie often wet and often dry; therefore, said he, we always covet as dry a farm-yard as we can get, for the rains will wet the straw often enough; or, if it chance to be a very long dry season, you may wet it by throwing water on it.—I have since found by experience, that, if dung lies always wet, it will not heat well, nor rot, and that it wastes itself and it's strength by the wet; therefore no better husbandry than to fling it into a heap.

1701 was a mighty corn-year, and a year which ran much to halm; so that the beasts could not eat up their straw, but it lay in the barton not half dung; I proposed carrying out the straw or longish dung, and laying it on my wheaten lay; a layer of straw, and a layer of wet and rottenish dung, thinking the wet and tolerably digested dung might rot the straw; but John Stephens of Ashmonsworth and farmer Crofs said, the long straw had better lie in the barton to take some rains, and then being

well wetted, and carried forth, it might by the wheat-seed-time be dung, but, according to the way I proposed, by that time it would produce nothing but finnowy or moldy straw.

§. 52. Columella advises to keep dung in a heap Age of till it is a year old, and no longer ; for after that dung. age, says he, it loses it's strength.

That new dung on cold land will run corn into straw, and make a great shew of corn, I doubt not ; but I do believe, the dung of one year old will produce the fuller bodied corn.—Using dung however of only a year old, to dung a wheaten crop, seems to be the occasion of the great produce of weeds in our corn-land in England.

§. 53. For three or four years they were very Time and fond at Husbome in Hampshire of laying their manner of dung on the land, and spreading it after the corn laying on was sown and harrowed ; but they grew weary of dung. it ; for their land was pretty light of itself, and the worms working up for the dung made it too light.

I was going from Holt through Tilshade to Salisbury ; Tilshade is on the downs ; I observed the village was carrying out long dung, which being in or about October (as I thought an improper season) it invited me to ask the reason. They told me, it was to lay on their ground sowed to vetches, and that they did not sow their vetches till the middle or latter end of October, when their wheat-land was sowed. Quære farther of this husbandry ; for it seems to me, where land is sowed late, it must be good husbandry, and bring the vetches forward, and warm, and comfort them, especially where land is light and weak, as it is generally about Tilshade, being a fine barley-land.

Farmer Elton advised me always, when I carried my dung out into the ground, to spread it immediately ; it will, said he, make the ground kirknel and fallow better, whereas to leave it in the heaps will

will rather hurt the corn, and make it lodge and grow up rank.—But, said Oliver afterwards, when I was talking to him of it, we often lay it in heaps on the ground; and in such case, when we carry it on the land, we dig away from the mixen the earth underneath about half a foot.

I was observing to farmer Biggs, that farmer Bond of Highclear flung no dung, in the spurning or spreading it, into the furrows, but carried a spit all along from the heap, and spread it near to the brink of the furrows, and so spurned to it. John Biggs said, he never saw it done, but that doubtless 'twas a very good way; for to fling dung into the furrows was to double dung them, by reason that on each side the furrow a furrow was veered in on the furrow—^p Prudent husbandmen, says Columella, choose to lay their dung on the upper ground rather than on the lower (or to dung the ridges rather than the furrows) because the rains will wash down the richer particles.

Quære, if ploughing in dung at stirring time may not be best, because of making the weeds grow, which are ploughed in at sowing the wheat.

Columella advises to plough in dung as soon as it is spread, that it's strength may not be exhausted by the power of the sun, and that the ground may be mellowed and enriched by thus lying mixed with it; therefore, adds he, you ought not to spread more dung than you can plough in a day ^q.

^p Prudentes agricolæ etiam in aratis collem magis quam vallem stercoreant, quia pluvix semper omnem pinguiorem materiam in ima deducunt. Columella, lib. 2. ch. 18.

^q Disiectum protinus fimum inarari, et obrui convenit, ne foliis habitu vires amittat, et ut permixta humus prædicto alimentis pinguescat; itaque, cum in agro disponentur acervi stercoreis, non debet major modus eorum dissipari, quam quem bubulci eodem die possint obruere. Columella, lib. 8. fo. 100.

Method of MANURING different Lands.

§. 54. Dunged land, in a wet year, bears the worst corn, especially if it be low stiff land; for dung then holdeth the moisture, and the ground being then wet withal, commonly doth produce a great many weeds, which can digest the spirit of the earth and water better than the corn can, because they grow much quicker. Cook, fo. 31.

Of dunged
land in a
wet year.

§. 55. Ground hard ploughed is apt to run to weeds, and dunging it, or folding on it early, will make it more subject so to do; for that will promote and forward the natural produce of the ground.

Of dung-
ing land
that is hard
ploughed.

§. 56. When we go on the improvements of land by dung, fold, or other manures, it ought first to be considered, what return we expect of profit; upon which consideration, I think, the gentleman, who undertakes the management of his own land, ought first to apply his manures in improvements to his clay-arable and mixt-arable; because the same expence shall double the value of such lands, and thereby render an acre of 10s. per ann. to be worth 20 s. — Whereas the same expence on poor white land, or poor sandy land, &c. of perhaps no more than 1 s. per acre, though it augments the value of the acre four times, is an improvement but of 4 s. per acre per ann. and then the improvements on such poor lands are not so lasting. 'Tis true however, there is one sort of manure always to be applied to white, sandy, or poor light lands from the first entrance into husbandry, which is your marles and strong earths, from whencesoever they are removed. From hence it may be inferred, that those do not best, who, when they build farm-houses, choose the situation on the most barren parts; for, if their grounds be healthy, and not worth above

The best
ground
ought to be
most and
principally
improved.

10s.

10 s. per acre per ann. 'tis more profitable to have the situation of a farm there.

Land that is worth 5 s. per acre, and land that is worth 10 s. per acre, and land that will bear two quarters per acre, and land that will bear four quarters per acre, do differ vastly in proportion of value; for, whereas the land that is worth 10 s. per acre is only double the value of that which is worth 5, the land that will bear four quarters may very well be worth ten times the value of the land that will bear but two quarters; because the price of feeding, dunging, folding, sowing, ploughing, weeding, mowing or reaping, &c. of the four quarters per acre barley is no more than of the two quarters per acre barley.

Wet
ground to
be dunged
more than
dry.
Of suiting
your dung
to your soil.

§. 57. Palladius tells us, that a wet soil requires more dung than a dry one^r.

§. 58. Monsieur de Quinteny's observation, abridged by London and Wise, fo. 29, is as follows, viz. Since the great defects of earth are too much moisture, coldness, and heaviness, as also lightness, and an inclination to parching, so amongst dungs some are fat and cooling, as the dung of oxen and cows; others hot and light, as sheep, horses, and pigeons-dung: and whereas the remedy must have virtues contrary to the distemper it is to cure; therefore hot and dry dungs must be used in cold, moist, heavy earths, and open and loose dung, in lean, dry, light earths, to make them fatter and closer.

Dung on
sandy
ground,
how to be
laid on.

§. 59. If you lay dung on a sandy or rocky ground, where it will be weeping away, the oftener, and less at a time you lay, so much the better; for if one lay treble the quantity, it will as soon pass through as a less quantity.

^r Ager aquosus plus stercoreis quærit, siccus minus. Pallad. lib. 1. sect. 6.

MANURE and MANURING. 61

§. 60. It seems to me, that he who sows whitish land to wheat, and dungs it, ought to dung it early in the year, and plough it in, that so the earth may have time to drink it up; for, if white land be dunged late, being of a dry nature, the wheat will have little goodness from it: I experienced this to my cost.

Time of
dunging
whitish
land.

§. 61. I had been to view a neighbouring farmer's black, moorish earth, which was truly of the nature of black heath: I asked him, what manure he found best for such land; he answered me, to fling pigeons-dung or malt-dust upon the surface of it; nay, said he, if I dung it, I fling dung upon it after 'tis sowed. And truly I think this the best way to manage such land; for hereby the dung will be kept longest in the ground, which is too apt to run downwards, and to be lost in ploughing it in, and to wash away; and if such ground was never sowed but one crop at a time, and laid down to grass, and the goodness of the surface turned in, for a second crop, it would I believe be best; and if it was refreshed again by a sprinkling of pigeons-dung, whilst the crop is growing, it would not be amiss.

Manure
for black,
moorish
land.

§. 62. The wet spewy clays about Holt in Wiltshire, (of which sort, as well as in other places, there are abundance) are observed by most experienced persons in husbandry not to answer the designs of those who pretend to improve by dung; the reason of which I fully observed this spring (anno 1707); for being here (at Holt) in the month of March, when the wind was very busy, every lugg square of the ground cleft many thousand ways, so that there was not a piece of earth to be seen, on which one might set the sole of one's foot, but it had large gapings in it. The same also it suffers in the heat of summer; from whence it is plain, that though these lands are of a strong clay, which generally pay

Cause why
wet spewy
clays are
not im-
proved by
dunging.

for

for their manure the best, yet being in this case too obstinate, and clung so that they could not easily dry, without splitting just like green boards, the moisture of all manures must needs be washed down, when rains come, through many hiatus's, which in a most hungry manner seem to gape for the vital substance of the earth; and so the soil is immediately carried down below the roots of all vegetables.

Whether
to lay dung
on the lay-
land or fal-
lows.

§. 63. Discoursing with several farmers about the best way to lay dung on the ground, whether on the lay-land or fallows, they seemed in general to agree, that the best husbandry was to lay it on the wheat-fallows, and then to stir it lightly in, if the land be strong clay-ground; for it if be laid on the lay, and then ploughed in, it will be apt to break up so deep, and thereby the dung be so covered, that it will hardly turn up in the other stirrings afterwards.

When to
dung mea-
dows.

§. 64. I found by experience this year (1701) that the earlier dung, or especially pond-mud, and coal-ashes, are laid on the meads, so that they may be washed in, the better the grass may be mowed.

Benefit of
dunging
them.

§. 65. To dung meadows and make them very rich in our hill-country, is excellent husbandry, not only for the greater quantity of hay they produce, but because thereby they yield a good bite of grass at lambing-time, which is to be valued according to the occasion, and with which we cannot be supplied for money; the aftermoss also, which is much the greater for it, lessens the consumption of corn by horses, and makes a halt cow fat, with neither of which one can be supplied but at unreasonable rates.

When to
dung them.

§. 66. In March this year (1706) I folded at lambing-time part of a mead, and fed the whole mead that year; but both cows and horses neglected that part that had been folded, and suffered it to grow up to great rankness; whereas the other part of the mead, especially the sideling piece, which had

ashes

ashes laid on it in the winter, they eat very bare; by which I do infer, all sorts of dung ought to be laid on in October, that the heat of them may be wasted by spring, and not taint the juices of the grass, and that ashes make the sweeter grass.

§. 67. I had farmer Biggs, Bachelour, and Crap, three excellent farmers, with me.—In our discourse about the improvement of meadows, they all allowed of the bringing straw thereon in the winter, for the worms to draw it in, to be very exceeding good husbandry; and farmer Bachelour said, he knew of nothing better than old thatch so drawn in upon meadows.

Straw, lay it on the meadows in winter.

§. 68. I believe that fine mortar-earth or mixed mold, which is excellent good for barley, carries the finer barley for being dung'd; for the dung mends the deficiency of such ground, which is inclinable to be too poor; but I do believe, on coarse clay-land, whereon the barley runs naturally coarse, dung rather makes it the coarser; for the infirmity of such ground is to be too rank, and coarse, and is still coarser for the dung.

Dung for barleyland.

§. 69. They never dung oats nor barley in Hants. In the hill-country oats do well without dung, and barley has the strength of the dung sufficiently after the wheaten crop.

Oats and barley not dunged in the hill-country.

§. 70. I was telling an experienced farmer, that I had ploughed down the linchet of a certain acre; and that my bailiff foretold me, I should have the poorest wheat on that linchet; which I wondered at, in regard of the richness of the ground; his reason was, that the harrows would draw down all the good * grete on the half lugg-lands-breadth below. The farmer said, 'twas very true, that in about three years ploughing 'twould be so, but not in one year, as he knew by experience; therefore the brows of the linchets are to be well dunged.

Of dunging linchets.

* Mold.

This

This argues, to dung a linchet you must lay the heaps above it.

Of dung-
ing rye-
grafs.

§. 71. Though I approve not of dunging French-grafs, nor clover, for reasons given in another place, yet it is proper to dung rye-grafs; for thereby the roots of it will tillow and mat the more on the ground, and will consequently occasion the greater destruction and suppression of the couch-grafs.

Of CHALK and chalking LANDS.

§. 72. Pliny tells of the custom of the Britons to chalk their lands to great improvement, which, he says, lasted their lives. lib. 17. c. 8.

Different
opinions
about
chalking.

§. 73. It is said in general, that chalking is better for the father than the son; however, others agree, it is as good an improvement for twenty years as dung; and that the clay-land has been always the better for it.

Chalk not
to be
ploughed
in deep.

§. 74. Farmer Farthing, farmer Wey, and divers others of the Isle of Wight, all agreed, that chalk should not be ploughed in too deep, but kept above ground as long as possible; for it would be apt enough of itself to sink down and be buried; on which farmer Farthing took occasion to say, that Col. Fleming, in moring and grubbing up wood, had to his knowledge found whole beds of chalk, an half spit thick, half a yard or near a yard deep in the ground, which, without doubt, was nothing else but the chalk laid in the ground before it was made coppice; for the chalk was of that nature, that it would sink downwards till it became a bed of chalk: to this they all agreed, but seemed to talk of it, as if it sunk in whole bits and pieces; but I told them, the truth of the case could be no other than this; the rain washed continually the chalk off by a white water, the sediment of which, when it came to

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the clay, there settled, and became a vein or bed of chalk, and then settled into a solid body : but in that solid body it did never sink, for that was impossible: chalk, however, by being ploughed in, without giving it time to waste, may perhaps be turned down and buried too deep, and being laid at the bottom of the furrow may not be ploughed up again.

§. 75. Chalk is not an improver to land in the same way as dung, which gives virtue to the land, and improves it by a fat, salt, nitrous quality, and by communicating to it the very principles of vegetation ; but chalk is rather an improver to land, as it is a great sweetener to sour land, but more especially as it opens the pores and particles of the land, and enables it to give up all it's strength, even till it is a caput mortuum ; so that chalk is not like dung, rich in it's own nature, but only mellows the land, so as to loosen the parts, thereby enabling every particle of it to communicate it's vegetative principle ; for which reason, it is true, that land abused by over-ploughing after chalking, or ploughed as long as it would carry corn, will be laid down to grass in a poorer condition than land can be when only dunged ; for it is almost impossible to draw out the goodness of such land, inasmuch as without chalk 'tis impossible to loosen it's parts, and unlock every clot, to let it's virtue fly out ; so that, properly speaking, chalk is rather a midwife to deliver the land of it's fruitfulness, than what gives the fruitful principles of vegetation to it.

§. 76. Chalk is commonly the greatest improvement of those lands that lie farthest from it ; because the lands that lie near it, partake and have too much of the nature of the chalk in them : they commonly lay twelve or fourteen loads of chalk upon an acre, where they lay it single, which will upon some lands cause extraordinary crops of corn for

How chalk improves land.

Chalk improves most the land that lies farthest from it.

fourteen or fifteen years together; and, where 'tis laid on grass-grounds, it will not so much increase the bulk of it, as it will make the grass sweet, so as to cause cattle to fat speedily, and cows to give thick milk. J. Mortimer, Esq; F. R. S. fo. 70.

In the Isle of Wight they sometimes lay twenty-five waggon loads of chalk on an acre; their chalk is of a fat soapy kind, and they call it marle. The farmers in the hundreds of Essex bring their chalk as far as from Gravesend, but lay not so much on an acre by half as those in the Isle of Wight.

Chalk,
when to be
laid on the
ground.

§. 77. If chalk be dug out of the pit, and lie a summer before it be scattered, it will be so hardened and dryed, that it will not easily flat or dissolve; therefore it should be dug at the beginning of winter, and laid on the ground forthwith; it cannot however be so well carried in winter, the days being short, and, being more fat and clammy at that season, you cannot load it so fast as in summer.

Chalk, an
improvement to
hot land.

§. 78. Mr. Worlidge in his art of gardening, fo. 13, says, that you may deal with chalky-land as with clay-land, tho' in a moderate way; for chalky land is naturally cold, and therefore requires warm applications; it is also sad, and will the better bear with light composts, which is the reason that chalk is so great an improver of light, hot, and dry grounds, especially having suffered a calcination.

Chalk sinks
thro' clay,
and vice
versa.

§. 79. If chalk be laid on clay, it will in time be lost, and the ground again return to it's clay; and if clay be laid on chalk, in time the clay will be lost, and the ground return again to it's chalky substance. Many people think the land, on which the other is laid for a manure, being predominant, converts the manure into it's own soil; but I conceive in both cases the chalk and clay is filtrated through the land on which 'tis laid by time, and, being soluble by rains into small corpuscles, is washed through the land on which 'tis laid; for neither of these

these manures is able to unite in it's finest corpuscles with the corpuscles of the land on which it is laid, so as to make so strict an union and texture with it as the land doth with it's self, and is therefore liable to be born downwards with rains, till no sign of it be left.

§. 80. I was arguing with Dr. Heron how beneficial it was to chalk meadows, even in the hill-Chalk on meadows. country : he assured me, that some of the notable husbandmen of Woodhay in Hampshire had told him, 'twas a common practice with tenants, three or four years before they left their farms, to chalk their meadows ; whereby 'tis true they would for three or four years fling out a great crop of grass, but then they would be much the worse for it ever after ; and this seems to carry some reason with it ; for the chalk so mellows and opens the pores of the meadow, that it enables the land to exhaust it's strength in all parts : for chalk does not carry so much fatness as dung does to the land 'tis laid on ; but it disposes the land to bear such crops by it's sweetness, and well disposing of, and correcting an ill quality the land had before : but still I see not that this is any objection to chalking of meadows, provided, whilst by virtue of the chalk they are bearing such burthens, you see they be refresh'd with dung.

Though chalk laid on meadows enables them to Id. and on pasture. give a great crop for three or four years, and will then impoverish them, yet I take it to hold quite contrary in pasture ; for the grass being thereby so much sweetened and increased, keeps constantly so much the more stock, by which it is maintained always in the same vigor.

§. 81. I do suppose that chalk laid on sandy, or Chalk good for sandy and clay land, and the reason, wood-seary ground laid up for pasture, may wash and sink in, and fill up the interstices, and thereby consolidate and mend the texture of such ground, and sweeten it, as it is a great alkali ; and tho' by

time most of the chalk may be washed downwards so that the ground may lose the virtue, yet I do suppose the strength of the ground may still continue much the better, by reason that such manure having made the sword of the grass come thicker and sweeter, the good pasturage on both accounts enlarges the quantity, and betters the quality of dung the cattle leave on it, which in return maintains a better coat and surface to the ground: and as chalk fills up the vacuities of sandy, or wood-seary ground, so on the contrary, it insinuates it's particles into obstinate clayey and strong land, and divides it, by making in a manner a scissure, thereby hollowing and mellowing it; so the two contrary extreams are cured by chalk.

Chalk improves
hop-clover
and rye-
grass.

§. 82. Chalk laid on hop-clover and rye-grass is a mighty sweetener, and improver of those grasses, being laid upon it after harvest, at the beginning of winter, or whensoever one can best tend it; it will quickly shew the benefit, especially if the ground be of a sour clay, and apt to run to coarse grass.

Of LIME and liming LANDS.

§. 83. All sorts of flints will make an extraordinary lime, but they are hard to burn except in a reverberatory kiln, because they are apt to run to glass. Mortimer, fo. 70.

Of a lime-
kiln and
burning
lime in
Leicester-
shire.

§. 84. December 9th 1699, I went to Grace-dieu, and discours'd with the person who rents the lime-kilns of Sir Ambrose Phillipps; and, two or three of his workmen being present, I with them took the measures of the kilns, which was $2\frac{1}{2}$ yards high from the very bottom to the top, one yard length-wise in the bottom, and two feet wide: they told me, that I must take care not to widen it too much at top, not exceeding two yards, by reason
of

of the greater consumption of coals ; for the more gradual the widening is, the better : there was a layer of bricks run within-side of the kiln, a-cross, between the two vent-holes where they draw out the lime, for the better support of the lime from tumbling down too soon. They burnt with culm, or coal-slack, which they accounted as well, or better than the other coal, and costs but 1 s. per load, whereas the fine coal would cost 6 s.—The kiln had five air-holes, two on each side of the bottom, and two on each side of the top, and one in the middle, of about a brick thickness wide ; the stone is very hard, and they said, three quarters of coal would only burn seven or eight quarters of lime ; the larger the kiln the more profitable. There was a stone that laid the length of the kiln to keep up the walls from falling : the wall of the kiln against the bank was but the thickness of a brick, but the opposite side a brick length in thickness. This kiln would burn twelve quarters of lime in twenty-four hours.

Farmer Farthing, (of the Isle of Wight) when I view'd his lime-kiln, told me, I must not set up a kiln to burn above eighty quarters at a time ; he burns but sixty ; that the kiln must be made to bel-ly like a stone-mug, that the flame may be beat down by the narrowness of the top, and check'd from flying out too fast. The kiln will be two days and two nights burning. The chalk must be arch'd over the fire like an oven, and carefully laid, lest it tumble in.—In his kiln, to burn sixty quarters he used to consume two hundred furze-faggots ; but now, as a great improvement in the price of liming, he uses peat in heating the kiln, and furze-faggots afterwards, and can heat his kiln with two thousand of peat, and burn it off to lime with five hundred furze-faggots. Of their country peat, he says, one may bring a thousand in a waggon. Note, the design of the peat (being a slack fire) is only to dry the

Id. in the
Isle of
Wight.

the marle or chalk by degrees, in order for the furze-faggots to burn it off to lime; for if the fire be not slack and gentle, the chalk or marle drying too fast will fly, and the arch with the chalk fall down; therefore when they used all furze-faggots, and no peat, he used not to put the furzes at first into the oven of the kiln, because the fire would then be too fierce, but only put the ends lighted to the mouth of the oven, and slack'd the fire as he saw occasion, by it's beginning to fly, which was a great trouble, and made a great waste of the furzes, whereas the peat is all put into the oven. When the kiln is fit for the furzes to be lighted, one may try by seeing whether the marle or chalk will bear their blazing without flying, and, when the furzes are set on fire, one may know when the lime is thoroughly made by the flame issuing out at top; for the flame will break out of the kiln for three or four hours red; but when the topmost chalk is lime (and then of course the undermost is so) the flame will be pale, like the flame of a candle. He thinks what I make lime of, being chalk, and not a chalky marle, as theirs is, may be perfected with less fuel than theirs, which is of a moist nature.—As soon as ever it is burnt he carries it out, and, when it is slack'd, spreads it. It must be carried out, though never so wet, otherwise it will give with wet weather, and run together to a plaister, that it cannot be dug up without great difficulty with mattocks; this must be done, though it is very troublesome to remove it in wet weather; for it will burn the mens hands, and blister them. He lays a bushel and half on a lugg-square, which is about thirty quarters on an acre. It must be spread the first still day, as soon as slack'd, and very carefully, for in the true spreading of it is a great advantage, and stirr'd shallow in.—Two men must attend the burning, who have each 12 d. per day, and 12 d. per night, and victuals.

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the man who lays the chalk in has 2 s. 6 d. for doing it.—Quære, If bean-stalks well dry'd may not make a fire as good as furze.—I was afterwards telling Mr. Thomas Beach in Wilts, that I thought the way of burning lime with peat not practicable with them, because they made it of a hard stone, which the peat could not work on : but he said, he was of another opinion ; for in the north, he knew very well, they burnt the iron-ore, and melted it with peat ; therefore he was sure, 'twould be a fire strong enough to burn the lime-stone.—Four or five hundred faggots less will burn a kiln, where the chalk is dry ; therefore it is of consequence to have your chalk dug a week before, that it may dry.

§. 85. Morris, my tenant in the Isle of Wight, and brick-burner, who came to burn lime for me, assures me, that in the island they have tried all sorts of ways of burning lime, and using it ; and that by experience they have found it the better way, when they have covered the heaps of lime with earth, to plough it in, and spurn or spread it immediately as soon as it is flatted fit for spurning, rather than to let it lie long covered with the earth in heaps ; and that the best way of all, they have found, is, not to carry it out into the field till the third earth that they plough for sowing their wheat, and then on the first flatching they have spurned it ; and, tho' the ploughing-in in such case has burnt the hair off their horses heels, yet it has not hurt the wheat, but they have then had the best wheat. — Note, I do judge the letting the lime lie in heaps, mixt with heaps of earth, for a long time, in Somersetshire, &c. is because the fallows will not work fine enough without being long exposed to the sun, and, if so, the lime would not be well dispersed, to the great disadvantage of the ground ; but, in lands working mellow, I am of Morris's opinion.

Lime to be
plough'd in
as soon as
flatted.

Sign of
good lime.

§. 86. I burnt a kiln of lime to a greater degree than ordinary, so that the bricks were all glazed, and in making and wetting up the lime I particularly observed the water, as soon as flung on, to boil and dance more than ordinary, and the lime to heave more, and in bulk the mortar (tho' the content of lime in bushels was the same) was much bigger: I observed it to the masons, who seemed much pleased with the goodness of the lime. — On which one of the labourers observed, that the case of lime was the same as of bread-corn; for as the drier the wheat is, the flour of such corn takes up the more water, and plimbs the more, and makes more bread in bulk, both lighter and hollower, (whereas the flour of cold damp wheat heaves not with the water, drinks little water, and makes heavy bread) so my lime, being higher burnt, took more water, plimb'd into a greater bulk, and would be mellowier and lighter under the trowel; and so all the masons agreed.

§. 87. When I told a gentleman, used to lime-burning in Wiltshire, that in the Isle of Wight they used to burn off a kiln of eighty quarters of lime at a time, he wondered at it; saying, how could they be assured to get it out before rain came, for I, that burn but a little, am forced to get a cover to keep out the rain, lest the lime when made should by rain fall into a plaister.

Stone lime
the best.

§. 88. Slack-lime cannot be so beneficially laid on land as stone-lime; because a greater virtue must be attributed to the stone-lime for it's burning quality after it is laid on.

Lime not
so good for
meadow
and pas-
ture as for
arable.

§. 89. Lime being laid on meadows or pastures slacks and cools by slow degrees, so as not to undergo such a heat and fermentation, as when it is covered with the hillocks of earth flung up in arable; therefore it cannot be of that great advantage to pasture.

§. 60. Worlidge

§. 90. Worlidge says, fo. 242. A mixture of lime is very good in most grounds; but the salt of limes extracted by water, and your ground watered therewith, is much to be preferred: it hath also this singular property, that it makes the worms soon leave the place so watered.

Salt of lime extracted by water commended.

§. 91. In Wiltshire they lay twenty-four or thirty quarters of lime on an acre, as the ground is. — But at Winterhays, and thereabouts in Dorsetshire, they never lay above twenty hogheads on an acre, every hoghead is four bushels. — The lighter the land is the more lime it will require, the stronger the less.

Quantity of lime on an acre.

§. 92. In Leicestershire they sow or scatter the lime on wheat-land when they sow the wheat, but on barley-land the last earth save one; and so plough it in, lest, if they should sow it with the barley in the spring, it might burn it. They lay five quarters on an acre of each, according to the measure as it comes from the kiln, for after it is slack'd those five quarters will near make ten.

When to scatter lime on wheat and barley, and what quantity.

§. 93. Liming of land being to bind it, it seems to me, land should not be limed late in the year, no more than building should go on then; because, the land being then cold and moist, and but a weak sun to consolidate it, the end of liming is lost; for if it consolidate not at first liming, it will not afterwards.

Time of liming land.

§. 94. Farmer Wey and others say, in the Isle of Wight they have a practice (which is the easiest way, in case a bushel of lime be laid in a lugg-square) when a bushel of lime is laid down, and the cart going, to tie a piece of leather to the spoke, and when that goes just round, it measures a lugg; for the compass of a cart wheel is a lugg, that is $16\frac{1}{2}$ feet: and, if you would lay it in a lugg and half, you may manage it accordingly.

Of scattering lime.

§. 95 Mr.

MANURE and MANURING.

§. 95. Mr. Taunton of Dorsetshire, in form of a bill for work, gave me the following account of the method and prices of liming; (the prices I think extravagant) viz. For covering an acre of lime, 1 s. 8 d.—Covering is when the lime is first laid on the land, it may be a peck in a place, and so covered over with earth.—For turning an acre of lime, 2 s. 6 d.—Turning is mixing the earth and lime together.—For spurning an acre of lime, 2 s. 8 d.—Spurning is throwing it abroad on the earth just before sowed.—For hacking an acre of lime, 1 s. 6 d.—Hacking is breaking the clots abroad after 'tis sown.—For shoveling the furrows of an acre of lime, 8 d.—Shoveling is the cleansing the furrows, and throwing it on the land.—9 s. per acre.

Method of
liming in
Leicester-
shire.

Hurtful to
their sheep.

§. 96. I ask'd Mr. Clerk about the method of liming about Loughborough; he said, they laid on their grounds they laid up to grass forty bushels per acre about the beginning of October, and on their arable lands the same measure; their way is, as the cart goes along the ground, to fling it over with shovels, and to spread it thin. It seems it has been very hurtful to their grass-ground in rotting their sheep in wet years; for it has proved the grass so fast, as to rot the sheep.—I supposed the lands were subject to rot before, or else the lime would not have subjected them to it; but Mr. Clerk said, no, that the lands were high up-land downy grounds, never subject to the rot before; and that many men in that country had proved it to their sad experience; and, since they had found it, their way was to remove such sheep in a wet summer out of such grounds, and put others in. Note, the lime in this country is strong: Mr. Chestlin is of the same opinion.

Mr. Chestlin of Leicestershire says, he pays but 12 d. per quarter for his stone-lime, and fetches it two miles; he lays fifty bushels on an acre, because his is colder moister land than his neighbours.—

He

He says, as it binds sandy ground, so it mellows and flats cold and clay-land. He can with a dung-pot and two men shovel it on about an acre and half per day. He says, he has had a fill-horse's black coat burnt red with it; if it be wet weather when they spread it out of the dung-pots, they cover their horses with old hammock-cloths, and yet it will burn them very much. — Mr. Bowly says, he never lays above forty bushels on an acre, but that forty when slack'd will be near eighty; if it lies out in the weather any little time, to have the dews or a shower of rain, it will slack of itself, but if they fetch it and lay it on their grounds directly, then they slack it with water. — He thinks lime shews not it's full strength and power till the third crop. One may over-lime; for where the lime is laid in heaps in the field before spreading or spurning it, there will seldom grow any corn for a year or two. — He says, they generally sow the lime on the ground, and then the wheat, and then turn it in under furrow: but in sowing it with barley, they generally sow it the last earth save one, and turn it in, and then give the last earth for sowing the barley; but, if they sow with a wheaten crop, and then lay down to grass, they sow the wheat on the ploughed land, and harrow it in, and then sow the lime, and harrow it in, in order to lay it down smooth to grass; for if they should harrow the lime in first, and sow their wheat, they would not in the second harrowing it be able to bury it, the ground would be so fine.

§. 97. A very understanding husbandman of Shropshire coming to me at Sir Ambrose Phillipps's, I asked him, whether his was as deep a country as Leicestershire: he said, it was. I asked him, if they used liming; he said, they did, and on enquiry I found the method in all respects agreed with the Leicestershire manner, saving that they laid dung and lime together, viz. about twenty load of dung,
and

Method of
liming in
Shropshire.

and but twenty bushels of lime on an acre. In the wheaten crop they ploughed in the dung the last fallow before sowing, and before the sowing the wheat sowed lime. — They fetched the lime fourteen miles on horses backs, because in their deep country the carts could not so well go: it was a stone-lime, not a chalk. He said, it cost at the kiln 3 d. per bushel, therefore with the carriage it must be very dear.

Of over-
ploughing
after lim-
ing.

§. 98. I deliver it as a rule to all husbandmen to be cautious of liming ground, and then ploughing out the heart of it. I limed some years ago in Wiltshire seven acres for an experiment, and laid down one acre to it's own natural grass in two years time, the grass of which is to this day worth 40 s. an acre. The third year I laid down another acre, which is to this day worth 30 s. per acre. The rest I ploughed five or six years farther, which is not worth fifteen groats per acre. The like experience I have had in burn-beaking ground.

Of harrow-
ing the
ground fine
before lim-
ing.

§. 99. Farmer Farthing, farmer Wey, and F. Loving of the Isle of Wight, told me, that if, after I fallowed, before I plough'd my lime in, I dragg'd or harrow'd the ground fine, the lime would mix much the better with the earth, and it would answer that charge very well.

Lime good
for sandy
ground.

§. 100. If we try the experiment, we shall soon find it very visible, that lime agrees with sandy ground by it's binding quality; and the like observation may be taken from the mortar commonly made of these two ingredients^{*}.

Of

^{*} Of liming from Mr. Du Hamel, a French author. Vol. 3. edit. 1754. p. 48. to 57.

Lime is used chiefly on fresh broke up lands; after having plough'd them up not very deep, they lay on the lime in the manner following.

They carry on the lime as it comes from the kiln; and lay about one hundred pound weight in a heap on every square perch; so that the heaps lie at a perch distance one from another,

MANURE and MANURING. OF BURN-BEAKING.

77

§. 101. Worlidge, fo. 234, says—In the burn-
beaking of land the rustic observes, that over-burn-
ing the turf is injurious, and that a more moderate
burning makes the ground more fertile. The rea-
son is plain ; for in the burning any vegetable, a
gentle,

Not to
over-burn
the turf.

ther ; then they raise the earth all round the heaps in form of so many basins ; the earth that forms the sides of these basins should be a foot thick ; and lastly, they cover the heaps, half a foot thick, with earth, in form of a dome. The lime slacks under this covering of earth, and is reduced to powder ; but then it increases in bulk, and cracks the covering of earth ; if you do not carefully stop these cracks, the rain will insinuate itself, and reduce the lime into a paste which will not mix well with the earth, or make a sort of mortar, which will not answer the end proposed. The farmers therefore are very careful to examine the heaps from time to time and stop the cracks : some only press the top of the heaps with the back of a shovel ; but this practice is subject to an inconvenience, for if the lime is in a paste within the heap, by this means you beat it so together that it will not easily mix with the earth ; wherefore it is better to stop the chinks by throwing some fresh earth over the heap.

When the lime is thoroughly slack'd, and reduced to powder, they cut the heaps with a shovel, and mix the lime as well as possible with the earth that covered it, and then having thrown it up in heaps again, leave it exposed to the air for six weeks or two months ; for then the rain will do no harm.

About the month of June they spread this mixture of lime and earth upon the land ; but not all over as may happen ; on the contrary they take it up by shovelfulls, and distribute it in little heaps at equal distances on each perch of land ; they observe that these little heaps promote vegetation more than if it was spread uniformly all over the field, and they don't mind leaving little intervals unlimed between each shovelfull. Afterwards they plough the field, for the last time, very deep : then towards the end of June they sow buck-wheat, and cover it with the harrow, and if any heaps remain break them with a hoe.

Buck-wheat occupies the land about one hundred days ; so that this grain sown about the end of June is gathered about the end of September.

When the stalks and roots of this plant are dead and dried, they plough it up, and immediately sow wheat and cover it with the harrow.

About

Of burn-
beaking
mossy
ground.

gentle, easy, and smothering fire doth not waste the volatile nitrous spirit so much as a quick fire would do, and causeth more of it to fix and remain behind.

§. 102. Where much long moss grows thick, tho' the ground be never so sandy in it's nature, yet the ground underneath must be of a most cold and sour nature by being kept from the sun, and the wet more fogging in it than if it had been solid earth upon it; for nothing retains water longer than such a spongy body, nor breaks the rays of the sun more from penetrating. Therefore such ground ought to be burn-beak'd, or the moss harrowed up before feeding, and burnt in heaps, but rather burn-beak'd to destroy the seeds.

§. 103. Quære, in burn-beak'd ground what weeds or plants appear the first year, because according

About the month of July or August, after the wheat crop, they plough as soon as possible; they plough for the last time in February or March in order to sow oats, or in April for barley, but in this case they stir the land two or three times to make it fine.

They harrow in all these different grains, and when they are come up they pass a roller over the oats, and if there remain any clods in the barley they break them with a hoe.

The next February or March they sow grey peas or vetches.

After the harvest of these pulse, they give one or two ploughings to prepare the land for wheat the ensuing autumn.

The year after they sow oats mixt with clover, and then lay it down to pasture for three or four years.

In some new broke up lands they sow no buck-wheat, but let it lie fallow from the month of March when it was first broken up, till October, when they sow it with wheat; making use of the intermediate time to give it several ploughings; these lands by this means being much finer, they use little more than three fourths of the quantity of lime above prescribed, and generally have a better crop than when they begin with buck-wheat.

Some farmers think a perch too great a distance for the convenience of spreading the lime; therefore they make the heaps less, and increase the number in proportion. Being persuaded that lime is most efficacious when near the surface, they first plough it in, and then give it a second ploughing before they sow, by which means the lime lies chiefly near their face.

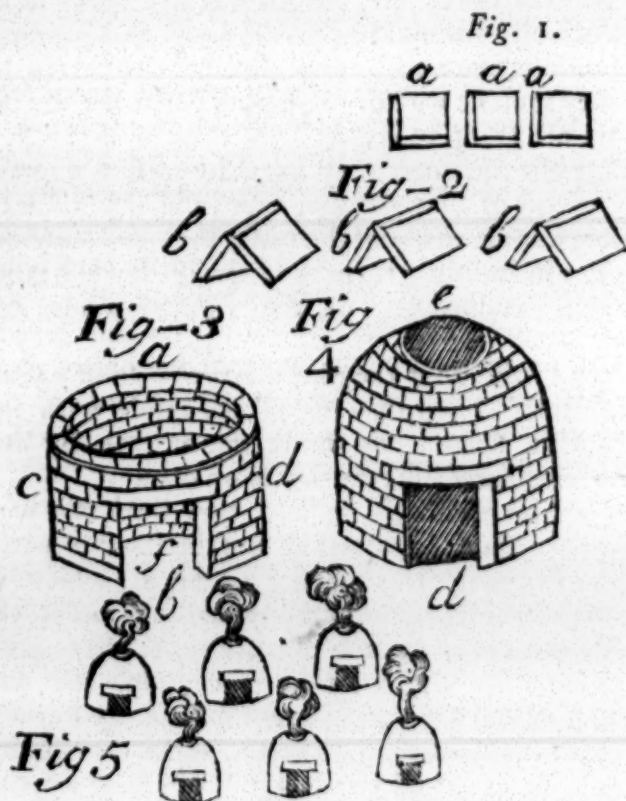
Others lay the lime in a ridge from one end of the field to the other; this disposition is the least trouble to spread.

ing to Mr. Bobart of the physic garden at Oxford, their seeds are destroyed; only some few may be supposed to have lain deeper than the fire went into the earth¹.

PLOUGH and CART-TACKLE.

§. 1. **M**R. Baily (who had many times set his own hand to the plough, and got 200 l. per annum, from a small beginning by it) and I were talking about the different varieties of ploughs

¹ The following is an extract from Mr. Du Hamel's account of burn-beaking in France, which I have here inserted, hoping it might be of use to the reader.



OF BURN-BEAKING.

With regard to lands which are ploughed up but once in eight or ten years, it is the custom to burn them, to the end that the fire

ploughs in different countries, and I asked him, wherein he thought a two-wheel plough had the advantage of a foot plough, or a plough without wheels. He said, he knew of no other use of a two-wheel plough, but that the ploughman could keep it more steady in stony-lands, so that every jolt should

fire may divide the particles of the earth, and that it may be fertilised by the ashes of the roots and leaves. This is the method of the operation.

They raise the surface with a hoe or crooked pickax, the iron of which is very broad and thin, cutting each turf as regular as possible in the form (a. a. a. fig. 1.) about eight or ten inches square, and two or three inches thick.

As soon as these turfs are cut, they employ women to pile them one against another, with the grass side inward in the manner (b. b. fig. 2.)

When the weather is fine, the air will dry them in a couple of days, sufficiently for making the furnaces and burning them; but, if it should prove rainy, you must be careful to turn the turfs, for they must be well dry'd, before you make the furnaces, of which we are going to speak.

In forming the furnaces, they begin by raising a sort of cylindric tower (a. b.) of ** one foot* diameter (c. d. fig. 3.) as the walls of this little tower are made of the turfs, their size determines the thickness; but in building them they always lay the grass downwards, and they make a door on the windward side, of a foot wide.

On the top of this door they lay a large piece of wood, which serves as a lintel. Then they fill all the inside with small dry wood mixt with straw; and finish the furnace by making a vault of the same turfs, like the top of an oven.

Before the vault is entirely finished, they light the wood that fills the furnace; then they quickly shut the door (d.) with turfs, and finish by stopping the opening (e. fig 4.) which was left at the top of the vault; taking care to lay turfs on all the places where the smoke comes out too plentifully, exactly as the charcoal-makers do; for without that precaution, the wood will consume too fast, and the earth be not sufficiently burnt.

If you cover the furnaces with earth, all the crevices being too closely stop'd, the fire will be extinguished; but, as you use only turfs, and always put the grass downwards, there is air enough to keep the fire burning.

** This must be a mistake, I suppose three or four feet may be a convenient size, as may be judged from the figure.*

When

should not fling it out of it's work ; for it stands to reason that the wheels cannot be so easily jostled off, as the plough might be without wheels : for the outward wheel goes in a seam, and is kept in by the whole land ; for the same reason, in hill-country-lands, where one ploughs along the side of a hill, any jolt would be apt to lift a plough without wheels out of it's furrow towards the declivious ground. — I asked him, wherein he conceived the advantage of
a plough

When all the furnaces are made, the field seems covered with little hay-cocks ranged in quincunx's (fig. 5.) but you must watch the furnaces till the earth is red hot ; to stop with turfs any cracks that may happen ; to repair such as may be in danger of falling, and to light again such as may be extinguished. When the earth seems all on fire they want no further care ; even rain itself, tho' before much to be feared, will not hinder their being sufficiently burnt ; so you have nothing more to do but to let them go out of themselves.

At the end of twenty-four or twenty-eight hours, when the fire is extinct, all the heaps are reduced to powder, except some of the tops which will remain not sufficiently burnt, they not being enough exposed to the action of the fire ; and 'tis for this reason that we advise not to make the furnaces too big, because, the walls being proportionably thick, the turfs on the outside will not be done enough, when the inside is over-done ; for if you burn them like bricks it will not be fit for vegetation. Besides, in making large furnaces you will have too far to carry the turfs. You might even make them less ; but that would consume too much wood : thus you will find it necessary to conform pretty near to the proportions we have prescribed.

When the furnaces are cooled, they wait till it rains, and then spread the burnt earth as even as possible, leaving none on the spots where the furnaces stood, which nevertheless will produce finer grain than the rest of the field, for which reason they leave only such turfs as are not burnt enough on those spots.

They immediately plough it very lightly, to begin to mix the burnt earth with the surface ; but they go deeper in the following ploughings.

If you can give the first ploughing in June, and rain follows, it is possible to reap some advantage from the land immediately, by sowing turnips, radishes or millet ; which will not prevent your sowing wheat or rye the autumn following

Nevertheless it is better to lose the advantage of such a first crop, that you may have the whole time to prepare the land well for the reception of wheat.

a plough with one wheel to consist: he said, in the same points as the former; he knew of no other reason for using them.

Of profic-
fion.

§. 2. In the Isle of Harries, &c. the way of tillage is commonly by ploughing, and sometimes by digging; the ordinary plough is drawn by four horses; and they have a little plough there commonly called a ristle, i. e. a thing that cleaves, the coulter of which is in form of a sickle: it is drawn sometimes by one, and sometimes by two horses, according as the ground is: the design of this plough is to draw a deep line in the ground, to make it more easy for the great plough to follow, which otherwise would be much retarded by the strong roots of bent lying deep in the ground, that are cut by the little plough: the little plough is used also to facilitate digging as well as ploughing. Martin, fo. 34. — This was also a common method used amongst the Romans, where the soil would allow of it. But it seems not practicable in stony and flinty lands, but without doubt in deep lands is good husbandry, and enables the ploughman to turn up the fallow in an exact and beautiful manner: I wonder these barbarous

Some choose to sow rye rather than wheat, because the first production being very vigorous, wheat is more apt to be laid than rye.

Some do not spread the burnt earth till just before the last ploughing for wheat; they content themselves with ploughing well between the furnaces, which they take care to set exactly in a line, in order to leave a free passage for the plough. But this is a bad method; for, since wheat is always apt to be laid the first year after burning, it is better to spread the burnt earth early before it loses part of its heat, and for the convenience of well preparing the land; for it is very material that the burnt earth should be perfectly well mixt with the soil.

It must be owned that this method of burning is very expensive, because the labour must be performed by men, and that it consumes a great deal of wood; but it is very advantageous, for after this single operation, the land is better prepared than it would be by many ploughings.

See

barous islanders should have it in use, and not we in in England ^a. The Romans in rich ground, that was apt to detain the wet, used this cutting plough, or what they called prosciffion, in spring, after the weeds were all come up, and before the seeds were ripened.

§. 3. I find in Leicestershire they use Danish iron in all plough-tackle and horse-shoes, except the coulter and the plough-shares, which are English iron. They hold the Danish iron to be more durable, and tougher than the English iron, which they cannot work so well, as being much brittler, and wearing faster : they can in Leicestershire afford the Danish as cheap as the English iron.—I asked the Loughborough smith, if Danish iron would make wheel-tire, he said care must be taken that the smith puts not in iron rank with steel, for then 'twill break presently ; but by breaking a bar before 'tis used the smith will know it.

Of the
sorts of iron
used in
plough-
ing-tackle.

§. 4. It is much the interest of a gentleman to agree with the smith for his plough-irons by the great ; for it is impossible such a person should watch his servants, so as to see that they sent to the smith such shares and coulters only, as were worn out, or to take an account how often ; whereas servants are apt before there is occasion, or the irons are worn out, consulting their own and their horses ease, to send them to the smith, who sets down the same price as if the irons had been quite worn out : so that if servants and smith be left to themselves, irons shall come again no better than they were when they were sent.

Agree
with the
smith by
the great.

^a See Pliny fo. 294, 294.—Pallad. fo. 94 to 98.—Varro, book 1st, fo. 37. Of prosciffion.

^b *Pingues campi, qui diutius continent aquam, proscindendi sunt anni tempore jam incalescente, cum omnes herbas ediderint, neque adhuc earum semina maturuerint.* Columella, lib. 2. fo. 99.—Of several new invented ploughs and their construction, see Mr. Tull's book of horse-hoeing husbandry.

On keep-
ing the
irons in
order.

§. 5. The better order you keep your irons in; the easier it is to the man that holds the full, and the easier to the horses that plough: the longer the point of your share is, the more steady does it go, and carries an even furrow.

Of keeping
a spare
coultter and
share.

§. 6. I take care to have a spare coultter and share always by me, which is in readiness, whilst the worn-out one might be sent to the smith to be new pointed; and this I do, because I expect the smith himself, and not his man, should have the pointing of it; for I depend on him for the well hardening it, which could not be, if I sent the worn-out one over-night to have it the next morning; I must then take who could be found, either master or man. Add also, that such coultter will be much the harder for lying by two or three days before used.

Old iron
bands on
new wheels
ill husban-
dry.

§. 7. To put old iron bands on new wheels is very ill husbandry, for the wood must necessarily wear out presently, the iron not being broad enough to save it.

Of mak-
ing the
bands to
wheels.

§. 8. An old Nottingham smith told me, it was much the durablest way to turn up the edges of the bands to wheels, which adds to the thickness of the edgings, and is the main security to the bands; for in the edgings they wear away first; but, for their own interest, wheel-wrights will pretend there is no advantage in it; yet where the edgings are not turned up, in the using the edges shall be worn away, and the fillies so worn, that the spokes shall be ready to start out of their sockets, when the timber in other respects shall be very sound. The smith said, the making them so was a penny in a stone difference to him.

Split ash
good to
make fil-
ies.

§. 9. Note, for fillies, ash that will split is with us thought fittest, and much the strongest; but the arms of an ash-tree are commonly put in, if they be not too frowe, and they must be saw'd, and the body of an ash likewise if it be knotty; because that
will

will not split ; yet, because such fillies are saw'd cross the grain, they are not like to be durable.

§. 10. Farmer Farthing, Wey, and Loving of the Isle of Wight, all assure me, that elm fillies are best for wheels, especially in deep ways, where the waggon sways, and only such they use in the Isle of Wight : for they will not crack with the nails being drove into them, as the ashen will ; but we at Crux-Easton, &c. use only ashen ones ; but I suppose the reason is, because elm grows not in the hill-country, and I the rather think so, because below the hill, where elm grows, they all use elm fillies. Elm good for fillies.

§. 11. If the farmers boarded their waggons in Hampshire, as they do in Hertfordshire, the price of the boards would be gained in one harvest by saving the droppings of the corn. Of boarding waggons.

§. 12. It is found by experience, that tying the side-boards to the raths of the waggon with leather thongs greased, is much better and more lasting than nailing them, because the heads of the nails are continually breaking out by the shaking of the waggon, &c. Of tying on the side-boards of waggons.

§. 13. It is a vast damage waggons receive in winter by lying abroad : when they are wet the frost cracks the wood. Of housing waggons.

§. 14. Every body grows weary of chequer-harness ; for tho' it looks pretty at first, yet it soon flies to pieces : chequer-harness is that which is work'd up with thongs. — The cheapest way is to work up the harness at ones own house ; the harness-maker has but 1 s. per day and diet, you finding the stuff ; in such case you must provide three or four bull-hides two or three years before, and put them out to dressing to the collar-maker ; the dressing commonly costs as much as the hide is worth, be it bigger or less ; when hides hold a pretty good price, a small bull's hide is worth 12 s. and it is common for the currier to dress one half for the other ; when these hides are dress'd they'll take no Of harness, and the cheapest way of making it.

harm for four or five years if kept dry, as suppose laid on the ground under the beds that lie on it; tho' it is said that is rather too dry. — A bull's hide should never be used by the shoe-maker, nor a cow's hide by the collar-maker, there being a statute that provides in that case, tho' not strictly observed. — A careful and good farmer in my neighbourhood keeps bull-hides always by him, and uses them on all occasions about his harness in mending it, unless for sewing thongs, and there must be white leather, but otherwise the bull-hide is always best. — The common price for a horse-hide undrest is 5 s. and the dressing 5 s. If the eyes of the plough traces are lined with leather, (which is good husbandry, to save them from fretting out) such lining costs no more than hempen traces.

The halters and cruppers and back-bands should be made of bull-hide, the belly-bands of heifer-hide, double-lined with horse-hide; the fill-hangs of horse-hide, the rigg-rope of white leather, that, is horse-hide; the pipes of the back and the collars of the belly of bull-hide. If the leather be not well tawed, that is, dress'd thoroughly with alum and salt, it will have a raw black seam run throughout, which, when it grows dry, will be hard and horny, and crack in bending; whereas, what is dress'd kindly, is like buff, soft, and one may blow thro' it. Few harness-makers, that are white tawers, understand how to dress their hides, but have them of the glovers or selmongers, and such can less answer for their goods. Such leather as is white tawed, is never tann'd: of my set of harness only the pipes and collars pass'd through the tanner's hands. With good usage they may last a dozen years, and wet weather will not damage them, if well dress'd, and made according to the above directions; but great care must be taken not to hang them against a plaister wall in the winter, that being the likeliest way to rot and spoil them.

§. 15. The smith, carpenter, wheel-wright and harness-maker, may be said to be the landlords of those gentlemen who keep much husbandry in their hands.

P L O U G H I N G.

§. 1. **T**HE ancient writers on husbandry lay a ^{Of pulve-} very great stress on making the ground ^{ration.} fine by frequent ploughings. ^a It is adviseable, says Pliny, in strong land, such as we generally have in Italy, to plough five earths, but in Tuscany nine earths; ^b and Virgil, adds he, is supposed to have prescribed four earths, or two summer and two winter ploughings, by the rule he lays down in his first Georgic.

Illa seges demum votis respondet avari

Agricolæ, bis quæ solem, bis frigora sensit.

^b It was the constant maxim indeed among the Roman farmers, that they could not give their ground too much tillage: and, if a field required harrowing after the seed was sown, it was a sign, with them, that such field had not been sufficiently ploughed. Land, say their authors, especially if it be of a rich nature, and that is apt to hold water, ought to be turned up so often, and reduced to so fine a powder, that the track of the plough-share may

^a *Spissius solum, sicut plerumque in Italia, quinto sulco melius feri est, in Tuscis vero nono. Plin.*

^b *Quarto feri sulco Virgilius existimatur voluisse, cum dixit optimam esse segetem, quæ bis solem, bis frigora sensisset. Plin.*

^c *Malè aratur arvum, quod satis frugibus occandum est; id demum rectè subactum erit, ubi non intelligetur utro vomer ierit. — Pingues campi, qui diutius continent aquam tam frequentibus densisque sulcis arandi sunt, ut vix dignoscatur in utram partem vomer actus sit; quandoquidem sic omnes radices herbarum perruptæ necantur: sed et compluribus iterationibus sic resolvatur vervaetum in pulverem, ut vel nullam, vel exiguam desideret occationem, cum seminaverimus; nam veteres Romani dixerunt malè subactum agrum, qui satis frugibus occandus sit. Columel. lib. 2. fol. 99.*

hardly be distinguishable in it ; for by this method the roots of all weeds will be torn in pieces, and destroyed.

Among the moderns Mr. Ray assigns several reasons for making land fine ^d and mellow before it is sown. It is beneficial, says he, that the nitrous particles of the air, which chiefly promote vegetation, may insinuate themselves more freely and in greater quantity thro' the cracks and interstices of the land, and there be precipitated and adhere to it ; perhaps the rain water also may be of use in dissolving those salts, which they carry with them into the pores of plants. Besides, the water sinks more easily thro' light loose earth, so that the roots are in less danger of being suffocated by too much moisture, or of being corrupted and killed by too much cold ; and there is this farther advantage in it, that by letting the air more plentifully into the air-vessels of the roots, it gives them a freer respiration, which we have already shewn is not less necessary to plants than animals.—Mr. Evelyn explodes those, who fancy the turning and ploughing land frequently in the winter, before it is employed for a crop, causes it to exhale, and spend the virtue it should retain, there being in truth no compost or lætation comparable to this continual motion : it evaporates the malignant halitus and impurities of the imprisoned air, laxing the parts, and giving easy deliverance to it's offspring. These seminal salts and rudiments, wherever

^d Tum ut particulæ aeris nitrosæ, quibus præcipuè vegetatio promovetur, in terreni interstitia liberius et copiosius se insinuant ibidem præcipitentur, et terreno adhærescant : quin et aquæ pluvizæ fortasse ad salium solutionem conducunt, quos secum unâ in radicum poros convehunt : præterea in terra laxa et soluta aquæ promptius subsidunt, adeoque nec humore nimio radices suffocant, nec frigore corrumpunt : præterea terra laxa et soluta ad hoc conducit, ut aer copiosior radicum tracheas subeat, ad respirationis usum, quam plantis non minus necessariam esse quam animalibus ostendimus. Ray, fol. 33.

wherever latent, are free to move and exert their virtue, when these chains and weights, which fetter and depress them, are taken off. He ascribes more benefit to often opening, stirring, and ventilating the earth, than to dunging.

But if to pulverize and grind the ground was the only end of ploughing, without any regard to the taking in the corporeal emanations of the sun, a frosty winter-fallow would chasten the earth, and make it as fryable as a summer one: but the difference is vastly great; for the sun improves the earth more than dung does. — As fire in lime, or burn-beaking, raises and fixes the salts, so does the sun, which is a fire; therefore the more you let the sun into the ground by ploughing, the greater the benefit.

In Asia and the hot countries their corn does not burn up, but is able to come out of the ground, which in England it would not do, if we had their hot weather. This seems to be owing to the mighty fineness to which their ground is reducible by the plough, they having such dry seasons for fallowings and stirrings, whereby their ground falls much closer than ours, and does not gape by the heat, but, by reason of it's mellow parts, drinks in abundance of the dews, which our land, less fryable, does not, and which dews, in great probability, fall more with them than with us.

§. 2. * The method among the ancients of ploughing from one tilt to another is laid down by Columella

The order of fallowing among the ancients.

* Uliginosi campi proscindi debent post idus mensis Aprilis; quo tempore cum arati fuerint, diebus interpositis, circa solstitium, quod est nono vel octavo calendarum Juliarum, iteratos esse oportebit: ac deinde circa Septembris calendas tertiatos: sed quandocunque arabitur, observabimus, ne lutosus ager tractetur, neve exiguis nimbus semimadidus, quam terram rullici variam, cariosamque appellant; ea est cum post longas siccitates levis pluvia superiorem partem glebarum madefacit, inferiorum non

mella as follows : Lands that are inclined to be moist ought to be first broken up from about the middle to the latter end of April, and, after this first ploughing, to lie still towards the latter end of June, or about the time of the summer solstice, when they are to be ploughed a second time, and about the beginning of September they are to receive their third ploughing : but it is better to omit either or all these ploughings, than to turn up the ground, when it is wet and in mortar, or even when the upper part of it, after a long dry season, has been wetted by sudden small showers, which have not sunk deep into it ; for, if you plough up the ground when in a wet and dawby condition, there will be no meddling with it again for the whole year, but it must lie useless ; and, if you plough it up when the surface only has been thus wetted, it will be barren for three years afterwards. The best season for ploughing is, when the ground is in a moderate temperament, neither very wet, nor very dry ; for by too much moisture, as I said before, it will cling together, and be like mortar, and, after a long drought, tho' a little moistened at top, the plough-share will either not be able to penetrate it, and be continually thrown off by the hardness of the earth, or, if it should penetrate it, it will not

non attingit ; nam quando limosa versantur arva, toto anno desinunt posse tractari, nec sunt habilia sementi, aut occationi, aut sationi : at rursus quæ varia subacta sunt, continuo triennio sterilitate afficiuntur, mediam igitur temperamentum maxime sequamur in arandis agris, ut neque succo careant, nec abundant uligine ; quippe nimius humor, ut dixi, limosos, lutososque reddit, at qui siccitatibus aruerunt, expediri probe non possunt, nam vel respuitur duritiâ soli dens aratri, vel siquâ parte penetravit, non minute diffundit humum, sed vastos cespites convellit, quibus ob-jacentibus impeditum arvum minus recte possit iterari : quo evenit ut in iteratione quoque scamna fiant. Accedit huc, quod omnis humus quamvis lætissima, tamen inferiorem partem jejuniorem habet. Columella, lib. 2. fol. 99.

make it fine, but turn it up in large clods, which will be a continual hindrance to you at it's next ploughing, and at last be left unbroken and in lumps on the field. Add to this, that even in rich soils, the part that lies deepest is always the most barren.

§. 3. One great reason of a summer-fallowing's enriching all ground seems to me to be, because the steams and vapours of the earth, which lie beneath the turf and furrow ploughed up, are, in the summer-time, constantly exhaling upwards, which being stopp'd and retarded by the furrow, and lodged in the caverns, are, after evaporation of the watery parts, by the fire of the sun, digested into fixed salts; for the continuation of the channels or pores of perspiration being broken by the furrow turned down, the effluviiums are stopped, and fix, as against a cieling of a vault.

Summer-fallowing, cause of the benefit of it,

I summer-fallowed the one half of a field in May and June for wheat; the other half I ploughed in September for winter vetches: the winter after I could observe the half sowed to vetches very much over-run with geranium columbinum, but the wheaten part had not the tenth part of that weed, notwithstanding it's having been dunged for wheat. So much is owing to a summer-fallow, which destroys the weeds before seeding-time, whereas in the vetch ground the weeds had seeded before it was ploughed. That winter vetches prepare the earth for a barley-crop next year, is very much to be imputed to the summer-fallow such ground may be supposed to have received the year the vetches were sown in it; and the dominion the vetches get over weeds the following summer, by killing them, lays open the bare earth to the sun the second summer also, which in a manner answers to two summer-fallows.

It

It seems to me no small regard ought to be had to keep cold clay-ground from running out of tilt, in respect that when it is so, the natural grass so matts it, and it is so clung with the roots thereof, that the sun cannot easily penetrate, to cherish and ferment the juices into vegetable salts; whereas, if you keep your ground knot-fine by summer-fallows, and clover-grass, which gets dominion over the natural grass, and plough it up before it runs to a sword, the ground will be loose and open, and easily penetrable by the sun, rain, and air, whereby it will be capable of being impregnated much more with those salts.

Not to
summer-
fallow
when wet.

§. 4. On sound experience I am thoroughly confirmed, that no land, especially clayey, ought to be summer-fallowed, when it is the least heavy by wet, in order to prepare it for spring-corn the spring following; for, tho' the ground may work mellow enough, as to the temper of the earth, having the summer's sun to shine on it, yet, being ploughed wet or heavy, the grass will grow so as to clod it together, and so matt the earth, that it will plough too rough in the spring to sow spring-corn at once ploughing.—It is the same, in case strong land or sworded land be winter-fallowed wet, or stiff, and heavy, in order to prepare it for stirring the next summer for a wheaten crop; it will turn up monstrous stiff and rough: in both cases you give away your first labour.

OF F A L L O W I N G.

I summer-fallowed a field when one part was burning-dry, the other part very dry also, but yet moister than the former; at Michaelmas that part which had been ploughed burning-dry had ten times more weeds come up in it than the other; from whence I infer, that the dryer you fallow still the

the better to destroy the weeds.— Again, I fallowed part of a field burning-dry in July, immediately on which came a very hard rain, which made the furrows, though ploughed dry, fall flat and hard, in which at Michaelmas very few weeds, comparatively of what might have been expected, if such rain had not fallen, were come up ; for the ground was thereby fastened before the seeds could chitt.

§. 5. The husbandry of cold, wet, strong clay-land in Wiltshire is to turn it up as early as one can in the spring for a wheaten fallow; if the ground be so dry and starchy, that eight oxen and an horse must be put to the plough, so much the better ; on this fallow (that is, on this one earth) they sow their wheat and drag it in, and have much better corn than if they gave their wheaten land three earths.— I think this husbandry founded on very good reason ; for such land, being ploughed up in so hot weather and so dry, becomes mellow and perfect dusty ; the earth being hard underneath, it will cast off the rains into the hollowness between the furrows, and will lie dry all the winter ; whereas, if such wet clay-land had been hollowed with two or three earths, it had lain fogging in the wet, and drunk it up like a sponge, and the chill would have killed the corn ; nor would it have fallen mellow under the harrow than the grete as above would do under the drag ; and the common saying of the farmers in Hants, that they see not but white land brings as good corn as clay-land, seems to make good, that they often manage clay-land in Hampshire ill in their ploughing.

§. 6. I am very sensible on experience, that you ought not to let ground you intend to summer-fallow for wheat run too far to a head of grafs, so that the sheep shall refuse to keep it short or bare ; for if the grafs comes to that pitch, you will not be able to make the sheep eat it, but a great deal of it will

On summer fallowing early in cold strong land.

Caution against letting the grafs grow too long on land to be summer-fallowed.

will run to bents; and when you summer-fallow, the furrows will not cover and turn over the ends of the grass, but it will lie out at the seams, and so being not covered from the air will keep growing, and the roots will consequently live, and matt, and plough up very rough when it is thwarted, tho' the ground was summer-fallowed never so dry. *

Manner of
fallowing
in Leice-
stershire.

§. 7. In their common fields in Leicestershire they give five tilts for their barley, and four for their wheat, five for their oats, and one for their peas and beans; their first fallowing for barley is about March, as soon as seed-time will give them leave; the second the latter end of May, or in June, as hay-making-time will give them leave; the third in July or August, as harvesting will permit; the fourth the latter end of October, or sooner, as the wheat season will allow; the last earth is when they sow, at the latter end of February or beginning of March: they say, if they did not make these many tilts the weeds would come up so fast, and seed, that they would be quite destroyed with weeds. The tilts for wheat commence, as for barley, about March, and so they hold on according to their leisure till they sow, which is about Michaelmas, and within three weeks after.—From hence it may be observed, that the deep land of the north can never want rain at seed-time, or soon after, for their fourth earth being taken about September, or October, the winter passing over it, and the earth being four months stale when they come to sow it, it must needs turn up so moist, as both to bring up the corn and to support it against the drought of any summer.

My servant was observing to me, that in Leicestershire they cared not how deep they went with their furrow, when they summer-fallowed, which, considering how subject they were to weeds, he looked on as a great fault; for, said he, if they went

†

shallow,

shallow, the sun would have power to scorch up the weeds and their seeds in a shallow furrow, as soon as it moldered after the first rain; whereas when they turn up so deep a furrow, the seeds and the roots of weeds are buried and kept moist, and cool, and lie quiet, and not being influenced from the sun and air to germinate and chitt, and thereby to be malted, they are secured in a safe repository, in order for vegetation, when the earth is again ploughed up for wheat.

Of the DURABLENESS of some SEEDS.

§. 8. It is manifest a great many seeds will endure many years buried in the ground, and yet never rot nor perish, but rise up again in their plants, when the ground by tillage is made a fit matrix for them: but, forasmuch as I can observe, these seeds are the smallest of seeds, such as poppy, charlock, and mustard-seed; for peas, beans, and other corn-grain, and acorns, and the like, will perish soon, being buried in the ground; the reason of which seems to be, because these small seeds consist of more oily or bitter juices, which preserve them from moisture, and, in the next place, they consist of such small fibres or vessels, that it is impossible, when they lie half a foot, or a foot deep in the earth, for the power of the sun so to rarify the juices into such particles, as to penetrate those minute tubes, on which all vegetation depends: whereas, when by tillage they have a light bed of earth, those seeds, which are turned up on the surface, lie in the warmth of the sun, where the particles of the earth are made very active and fine to pass their tubes. Thus those larger seeds, abovementioned, whose juices are less oily, and their tubes more open, are easily penetrated by the heavy and gross juices, which lie a foot deep in the earth, but not
being

being able to protrude a root downward, nor a plant upward, by reason of the closeness and pressure of the earth, from a plethora of the juices, it is necessary that an extravasation must follow, from whence a corruption must proceed. From hence I conceive it is, as Meagre writes, that primrose-feed, which is exceeding small, being sown in fine mold, some of the seeds will not come up under three, some under four, five, six, and seven years; some of those seeds, I suppose, lay buried deeper, some shallower in the ground, and the juices that lie deeper require more time to be rarified than those lying shallower. — That seeds are more hardy, and can endure more than is generally conceived, Mr. Rudge of Portsmouth gave me an instance; he affirmed, that until king William's time they did not use wormwood in their ship-drink; but that of late they have used it with their hops, which are constantly boiled two hours, and then flung out on a dunghill, and that in those places now grow great quantities of wormwood at Portsmouth, where none grew before. And Dr. Bradyl of Leicester did assure me, that at a dyer's in that town, who used the *attriplex baccifera*, and boiled it in his dyes, after it had much boiling, and was flung out on the dunghill, there would grow up, in great quantities, from the seeds of it the *attriplex baccifera*: the berry of this plant is like a mulberry, and it's seeds are exceeding small. When Mr. Ray says the *erysimus Neapolitanus* (wild cress, or hedge mustard) did grow in that abundance after the fire of London, he adds, that this plant brings very small seeds and in great quantity; therefore a hundred years might it lie without germinating, and not like to germinate then, unless it's tubes were put in action by the heat of fire. Sir John Floyer, in his *Touch-stone of medicines*, tells us, that poppies are very mucilaginous, and contain an oil, as appears

pears by a milky juice ; and an oil is pressed out of poppy-seed : this seems to account for the great length of time they are suspected to have laid in the ground, where grass-lands after many years have been ploughed up, and this plant has come up so plentifully. Sir Thomas Brown also, in his *Vulgar errors*, gives several instances of the lasting vitality that some seeds are endued with. If Le Grand had been acquainted with, and considered these instances, he would not, I think, have so readily asserted the equivocal generation of plants : for his argument is — If you dig up the earth an ell deep, it will, without sowing, be fruitful the first year, but, if you turn it up deeper it will not be fruitful till after a year or two. † The seeds therefore of plants, says he, are those insensible particles, which, by the agitation of the subtle matter, acquire that situation, figure, and motion, which are necessary towards the formation of the first rudiments of plants : but this formation is not so soon compleated, nor are plants produced so quickly this way, as in the ordinary manner of raising them from the seeds of plants.

Of equivocal generation.

Surely we have great reason to conclude, from the instances above mentioned, that the earth does not produce the most contemptible weed without a seed ; and we find that even at the beginning God took not that method, nor did the earth bring forth plants in that manner when it was vastly rich ; for it is said, Gen. ch. ii. ver. 5. — “ that God made every plant of the field before it was in the earth, and every herb of the field before it grew ; ” and it seems as if Moses had said this to prevent an hypothesis,

† *Plantarum igitur semina sunt insensibiles illæ particulæ, quæ, per materiæ subtilis agitationem, eum situm, figuram, & motum acquirunt, quæ necessaria sunt ad primum stirpis rudimentum efficiendum ; sed eorum conformatio tardius absolvatur, seriusque ex illis plantæ proveniunt quam ex feminibus plantarum. Le Grand, p. 466.*

that matter could act so nobly on matter; what is recorded therefore in the preceding chapter, viz. that God said, "Let the earth bring forth grass, the herb yielding seed, &c." can only mean, that God had it come forth out of the ground. Patrick will have those words above quoted, "before it was in the earth," — interpreted — before the seed was in the earth, which if the Hebrew will allow of, yet the foregoing words in that verse, "God made every plant of the field," — shew the earth did not produce plants, as causes naturally do their effects.

Of summer-fallowing for barley.

§. 9. A great advantage in summer-fallowing for barley is, that your barley-land seldom is sufficient to provide for all the grasses you sow, and oat-land will seldom knot fine enough to sow; but if oats be sowed on the barley-stubble which was summer-fallowed, in all likelihood it will knot very fine, and be fit to be laid down to grass.

To summer-fallow for barley, in order to destroy weeds, you ought to fallow before the living weeds run to seed, and yet so late, that the seeds of such weeds as are in the ground may not have summer enough to grow up and seed before winter come, but as soon as may be (avoiding the latter inconveniency) is best; because when weeds are most turgid with juices, by being ploughed up, their roots are like to be killed by a plethory: for the time of weeds seeding consult the herbal.

Lands lying to the north, being cold clay-lands, should, if sowed to barley, be summer-fallowed, in order to sweeten the ground, and sowed under furrow, the middle of March, if the earth can possibly be got dry enough, that the barley of land exposed to the cold may be got ripe before the sun leaves it, and frosty nights come.

Of fallowing poor cold land early.

§. 10. It ought to be observed by the husbandman, not only what grounds are cold and sourest, but also what part of every ground is so; this he will

will easily discern by the grass the cattle shall refuse, unless hunger forces them to eat it: in the hill-country we may generally perceive those grounds, or parts of grounds, which lie upon a declivity from the sun, or are cooped up between hills, so that the sun cannot freely irradiate them all day, and are not so pervious to the air and winds, do bear a much sourer grass than the summits of the same field; and it is refused by cattle, especially at a time when grass is plenty: I do advise in such case, that the husbandman take hold of all opportunities and seasons to turn up such parts of a field early in the summer to the sun, and also that he stir it more in the summer, thereby to sweeten it for grass, and render it kinder for corn; for he may be assured, such ground as bears sour grass, however it may bear a burden of straw, will not bear a plump berry, but a thin coarse sort, which will not fill the bushel, as finer rinded or floured corn will do.

On my farm there is land, which tho' very cold, poor, and whitish ground, or woodseary, yet is very apt to run to sour, rowety grass, tho' it has born corn but the year before; on such pieces of land we ought to have a circumspect eye, both in respect of ploughing them very dry, and hot, and earlier than other lands, before they are run to grass, so as to nip the grass, as it were, in the bud.

§. 11. I find the evil of white poor ground chiefly is, that all the spring time it ploughs up too dry to bring up the corn, and tho' it be just wet enough for mixed or clay-ground to bring up corn, yet that white ground so soon dries, either by heat or the cold churlish winds, which come at this time of the year, that the corn is checked in its * chissum; therefore, if you sow such land on fallows upon a second ploughing, my advice is, that you fallow early; for stale fallows will work moist. When you plough for sowing also in the hill-country, there

Of winter-fallowing.

* putting forth its roots.

are advantages in ploughing the poorer or mixed land first, if it lies warm and in shelter, and the stronger clay-land last; because, when the season of the year for sowing draws towards an end, the fallows being too dry for the corn to grow without rain, the full, in strong clay lands, that have a depth, may, without damage, be carried lower than the stale fallow, into the fresh mold, which will turn up moist, (whereby you may have your corn all grow) which, in hot summers, in the hill-country, is the life of a crop.

Of winter-
fallowing
dry.

† mold.

§. 12. If ground be ploughed dry, tho' ever so much rain should fall after it, it will soon be dry again, for the same passages the water found to wet it, are also permeable to the sun: but if ploughed wet, it will not dry kindly again that season, for the † grete is in a manner crust thereby, and blended so in a dab together, that the sun cannot penetrate it; but his rays are refracted.

I was observing to a certain farmer, that a certain field did not produce me so good a crop of oats as I expected, the ground having been fed to hop-clover for two years. The farmer replied, he believed the reason was because the winter proved so wet, and, that being a white ground, we still went thither in wet weather, because ploughing in such weather did not that harm in white ground that it did in other, but that white ground so ploughed bore the worse corn, which I believe to be true. Beware however of either summer or winter-fallowing poor land in the hill-country too dry, so that it turns up deep, and breaks lower than the staple: by experience I know, you impoverish such land as much, by jumbling the bad with the good, as a year's dunging with the pot can do it good: and all the experienced farmers I have consulted, which are many, are agreed, that tho' it is best to plough up wheaten land in dry weather, (for if it is fallowed
wet,

wet, it will be apt to chill all the year) yet white land should be ploughed up somewhat wet; for, when dry, it is apt to break up in too stiff clods, and turn up below the goodness of the mold. I have found by constant experience in our hill-country land, where the chalk in many places lies shallow, if, by reason of ploughing too dry, the chalk brush tears up, the corn will in that vein become defective some years after, tho' more manure be bestowed on it than on other parts of the same land, where the chalk has not torn up; therefore fallow not such land too dry.

The air and watery parts in earth ought to have a free circulation, as in our human bodies, otherwise a corruption and poison of humours arises: the case is the same in earth ploughed up wet, which clings and holds in all the watery body, which then is very much, till it corrupts, and lets in no fresh air, dews, &c. Now earth should be always taking in and perspiring out, even as our bodies do.

If ground be worked wet in seed-time, the wetter it is, the less can a plough dispatch in a day; for if it clings and sticks to the plough, and to the holder's shoes, it hinders the speed, nor shall the harrows harrow it so well at eight tinings as otherwise at four.

§. 13. If your ground be cold clay-ground, or four ground, such as I have, take care to pursue the ploughing it up whilst the ground is in the most burning condition, and dry over-head; and stop when either of those cases are wanting; and either give your oxen play, or contrive some other work for them. When your ground is so ploughed up in fallowing, it will always turn up again rotten, and in good order; and by such methods of never fallowing your grounds cold and wet, they will in some years time be marvellously sweetened, made healthy and kind for corn, and you will get a domi-

Of fallowing dry in cold land.

nion over all common grasses and herbs of the field, so that such hill-country-ground, after it has lain down to clover, will turn up the second year knot fine, or fryable, which is a very auspicious temper to promise a good crop.

Different
practice in
hill and
vale-coun-
try, in win-
ter-fallow-
ing.

§. 14. The difference in practice amongst husbandmen is very great; to plough up many grounds in the winter, and let them lie so till seed-time, and then to sow them with oats or barley on one earth, i. e. drag the corn in without more ploughing, is a frequent custom amongst the hill-country-men, which the vale-men, when they are told it, are surprized at, and say, if they did so, they should have nothing but weeds, which I believe to be true; but, on the other hand, it is undeniable, that the hill-country-men, whose land lies cold, do this with good success. These different events seem to me to depend on good reasons, viz. high hill-country-land lying bleak and cold, and being somewhat poor, yet, if it be of a clayey kind, being ploughed up early, will not, by reason of it's barrenness, and cold exposition, produce weeds during the winter; the seeds of weeds in such cold beds lie asleep, till roused out of their lethargy by the warmer air and sun of the spring; whereas in warmer soils, which lie in the vale, where the land is commonly richer, the seeds of weeds, even during the winter, if the ground be hollowed up by ploughing, and mellowed by rains and frosts, will sprout and put forth a blade.

Of plough-
ing unsea-
sonably.

§. 15. I was saying to farmer Elton, it was the common opinion of farmers, that a team should be still going, in season, or out of season; but I differed from them; for when a season presented itself, and I was behind-hand, I should not scruple the hiring three or four days work of a plough, and, if a season did not present itself, should not scruple the going on somewhat towards a second year's crop.
He

He agreed with me, and said, 'twas better to be in the stable than to do things out of season, and said, there was a piece of one of his fields an instance of it; they went to fallow there in a wet time, because they would not stand still, and that part of the ground has worsted three crops since successively, and made it run to weeds.

§. 16. It seems to me to be very wrong (tho' in the hill-country, where the earth is consequently dryer) to winter-fallow across the lands or furrows, if possibly it can be avoided, especially if the lands lie on a descent, and are of a cold clayey nature; for the current of the water is thereby stopt, and the field lying the wetter for it is thereby soured and chill'd; it seems therefore, that such lands should be winter-fallowed the same way the lands and furrows lie, if they lie upwards and downwards especially.

Winter-fallowing.
—Not to winter-fallow across the furrows.

The ground generally winter-fallowed better in anno 1718 than had been observed for many years: the reason doubtless was the long, hot, and dry summer the preceding year, whereby not only the earth, through the drought, was made more fryable, but also the free growth of all weeds, and their roots, which matt the ground together, and harle in the clots, was checked.

The philosophers seem to agree, that in winter the air is fuller of nitre than in summer; therefore a winter-fallow, to let in the nitrous particles of the air, must be beneficial.

§. 17. It seems the winter-fallows of every ground are then most seasonable, when you can make the furrows stand most upright, and so continue, with as little falling down as may be, that thereby the land may lie the healthier and dryer, and shoot off the rains; whereas by falling flat it lies foggy, spongy, and cold. — Accordingly I was telling a very good farmer in my neighbourhood, that I thought it was better not to winter-fallow stiff land till the frosts

When winter fallowing most seasonable.

were near at hand; for, if one fallowed such lands early in October, they might settle too much before the frosts might come to hollow them. He replied, if it was lay ground, it might be as I said, but, if it was stiff land that was ploughed the year before, it was best, he thought, to plough it up as soon as I could, tho' the very beginning of October, before it had time to settle after it's last burden of corn; for then it would, when first fallowed, molder fine enough.—Tho' clay-lands however ought to be fallowed early for the better mellowing them, yet it seems to me no loss of time, but rather gain, to wait a little for the dry frosts; because in such weather you will better effect your ends. If the fallows should have been flatted by the rains, the frost having less power over them, they must needs be more inclinable to run to weeds; on the other hand, tho' fallowing should happen when the ground is very wet, yet if dry frosts follow, and not wet weather, such fallows may do very well. The reason is, because such frosts uphold the ground from falling, till it settles in the ridges in an upright standing, and consequently receives the benefit of the frosts: but this venture is not to be trusted to, lest wet weather should come after such fallowing, which is most likely, as the ground is already full of wet; and yet the farmers will plough and fallow in the wet, knowing, that they sometimes have had as good corn after a wet fallow as a dry one; but of the accidents, whereon it depended, they were ignorant; otherwise I judge they would not have done so.—On the like reason, in my opinion, depends the wholsomness of the summer-fallows; for, if the fallow be wet, it will be in danger of falling flat, unless very dry weather follow, to support the ridges: consequently the sun has less power over the parts, nor can it kill the weeds by it's burning heat, as in a dry fallow.

I gave

I gave a barley-fallow to a broad-clover field in July: some said, it would not gain it's end, but lay the ground chill for the whole winter.—By Michaelmas I found it full of all sorts of weeds green on the ground, which when stirred would all be destroyed.—Note, that fallowing land well carries a whole furrow in the winter, and cannot be supposed to lay a ground wet during the winter, but rather dry, seeing the furrows have gutters between them, for carrying off the water; but if the ground falls small, then it may lie foggy and spungy. The harrowing this ground after it was fallowed, made it fine, so that it brought up weeds in abundance, which would be stirred in, and so destroyed, and yet it lay hollow underneath.

The reasons of early fallowings and stirrings, or thwartings, seem to depend altogether on the nature of the lands you have to deal with; for if it be probable that ground may work dry and mellow at spring-feed-time, care ought to be taken to fallow so early, that you may thwart early, I mean in January, that your ploughing at seed-time may be moist; but your fallowing, if the ground be not grassy, may be later, especially your thwarting, viz. not till March, if you are apprehensive your ground is like to be too wet at seed-time; for 'twill plough much the drier at seed-time for being thwarted late in a dry season.

I fallowed a lay ground to grass in October and November; I began very early to plough it, and sowed barley in it, viz. the 25th of March: notwithstanding the fallows were very stale, and, being sowed so early in the year, one would think the ground moist enough to bring up the corn, as by turning up the furrows it seemed to be, yet the ground ploughing very rough, being of a white nature, and requiring ten tinings, it was a very great disadvantage to the corn's coming up, there being
no

no rain; for the weather was hot, or windy and dry, when it was ploughed, and the tumbling it up and down so often with the harrows dried the ground too much: so therefore to order white ground, that it may harrow at four or five tinings, and thereby not lose it's moisture, is good husbandry.

Mr. Raymond says, the good husbands with them (in Wiltshire) fallow up all the lands in the beginning of winter, and finish by October, if they can, whilst their horses are at grass, and then lay them up at a cheap keeping all the winter: this they do in Leicestershire, as I have elsewhere noted.

Seeing the finer earth is tilted, the more each part of it communicates it's virtue to the grain laid in it; I suppose the finer it is winter-fallowed (for the same reason) the more the winter rains and frosts communicate their virtue to the land.

Of winter-fallowing for wheat.

§. 18. The finer the earth is made by often ploughing for wheat, the closer it lies all the winter to the roots of the corn, provided you sow corn in good time, so that the frosts come not to hollow it before it is settled; for, not having time to settle, it is in more danger of being hollowed by the frosts. From my walking over the fallows, and observing how dry, and healthy, and exposed to the frosts, weather, and sun, the convex parts lay, and how the many small concave parts and hollows lay to receive the sun's strongest heats, I cannot but think it great husbandry to fallow up grassy, or strong clay-lands in the winter-season, for wheat, tho' one must give them an earth the more possibly in summer, by fallowing twice instead of once: indeed this cannot be done vice versa to barley, by giving that a summer-fallow, because barley is sown after some corn that grew the summer before.

By winter-fallowing for wheat you have this certain advantage, that the fallows are so mellowed by the winter-frosts, that all the spring and summer

long

long they drink up the rains and summer-suns the more greedily.

In winter-fallowing for wheat there also sometimes falls out this advantage (as in anno 1705, when no rains fell from April to the second of July) that you have not only so much land fallowed beforehand, when no plough could follow in lay-lands by reason of the dryness, and consequently the farmers must be behind-hand; but you may also all that season stir the winter-fallows, for all that time they will work.

§. 19. Whereas in the strong deep lands of Buckinghamshire, and in some other countries, where there are strong lands, the farmers hold it ill husbandry to sow much barley, and they are restrained from it by their landlords, from an opinion that barley impoverishes their land beyond other corn. I am apt to think, if barley impoverishes such clay-land, it must proceed from the winter-fallowing it, and tumbling it about in cold raw weather, when it is wet, being cold clay-land, whereby it is chilled and soured; whereas I suppose they plough not up for peas and beans and oats till the spring of the year, when they are sown; and peas and beans hollow and mellow the ground.

Of winter-fallowing for barley.

The first considerations, after wheat and vetches are sown, in order to a barley-crop, are of this nature, viz. to fallow up those grounds which you do not fold, and of them to fallow those first which are declivous from the sun, or by reason of high trees or hedge-rows are much shaded, or by reason of hedge-rows or declivities are skreened from the north and east; for all such grounds may and ought to be sown first with barley; and therefore the earth ought to be prepared first, and if such fields are to be folded, they ought to be folded first, in order to be fallowed as soon as may be.

§. 20. Mr. Edwards observes, the first thing the farmers do after harvest is to fallow for black oats; for

Of winter-fallowing for oats,

for

and for
peas.

for the older the fallow is they sow black oats on they observe it to be the better : but, if they sow white oats, they fallow but before they sow, for the later the fallow is for white oats, they count it the better, for white oats love to lie light ; and, said he, they never give two earths to black oats, but, if the ground be such as is run to grass and a stiff ground, it is better, and will well answer, in case you sow white oats, if you give it two earths : nay, said he, some of our clay-lands are so stiff, that it would very well pay if two earths were given to peas also, for it is impossible sometimes they should shoot their heads through. I said I never knew two earths given to peas before ; he replied, farmer Biggs, if I would talk to him, would tell me the same thing ; and he was sure he lost half a crop for want of it.

It was the 16th of October, and farmer Biggs had fallowed for oats ; I asked, whether the land (he sowing on one earth) would not be too stale, and lie too hard at seed-time. He said, no ; if land worked light (for on this land he had sowed oats also the last year) it would be in fit temper enough at spring ; that he and others commonly gave a fallow to some oat-land by the very beginning of October.

Of Winter-fallowing early for O A T S and B A R L E Y.

§. 21. On the 20th of October, 1719, I began ploughing a field of fifty-two acres for oats, which had been sown to corn, and chiefly to vetches, so that the stubble ploughed up so fine and small, that it might be well supposed the ground by the winter rains would fall flat ; I had finished ploughing these fifty two acres by the 20th of November. — Notwithstanding it was light and white ground, and fell so fine, yet at the oat-feed time, Feb. 20, the harrow

row tinings being good, the oats were laid deep enough in the furrows or seams: for tho' they seemed to be closed, they were not so, but there were cavities underneath, tho' the seams closed at top. This ground was all harrowed off at five tinings, which was the effect of early ploughing in the winter. This method of fallowing light ground succeeded admirably well, and answered in every respect; the oats were let in deep enough, and prospered in colour beyond those I sowed that year in strong land on two earths, and when I mowed them, the 15th of August, they were in every respect great oats, and the hop-clover I sowed with them succeeded very well. I concluded therefore from this and other experiments, that ploughing such light ground (which falls fine) thus early is best, since the oats can be let deep enough into the seams, and by that means the ground so ploughed, taking the winter rains, will retain so much moisture as to bring the oats all up, the contrary of which is the danger in all such light grounds,—For the same reason I began fallowing such light lands for barley as early as the middle of October this year, that so they, being beaten flat by the winter rains, and being drunk with them, might retain sufficient moisture to bring up the barley at spring.

In the beginning of November, 1712, I ploughed up four acres of a field consisting of fourteen acres, which had lain down to broad-clover for two years, during which it was mowed: tho' it was a clayey ground, it broke pretty * knot by the * fine. plough, and therefore, having much other business in hand, I thought I might delay the tearing up the rest till the latter end of January, and that it would harrow very well by the latter end of February, sowed to oats; accordingly, the latter end of January I ploughed the rest, and sowed the whole field with black oats the latter end of February: the ground

ground dressed with the harrows very well ; only this difference I observed ; the four acres ploughed in November was broke by the frosts to dust ; the other part ploughed last was not so fine, but worked very mellow. This experiment I made on conjecture that the four acres ploughed so early would carry the best oats, and my expectation was answered ; for the whole field from the first appearance gave me great hopes of a good crop : but by the latter end of May the four acres ploughed so early was distinguishable in colour, to lookers on, at a quarter of a mile distance ; for it was much the stronger, and darker in complection. June the 8th, which was nine days after, I took a view of another field, consisting of six acres, which I had ploughed in the winter in the former manner, viz. — I ploughed up four acres thereof in October, when the ground was very dry, and in January I ploughed up the two remaining acres, the ground being likewise then very dry. This field had been, as the other above-mentioned, sowed two years to broad-clover, and it turned up mellow in both parts, when sowed to black oats in the latter end of February, and harrowed knot-fine, only with this difference, that the four acres ploughed up in October worked in dust, or like ashes. The consequence of this husbandry was as the former, viz. — June the 8th the oats in the four acres, so early ploughed, looked more proud, were thicker, and of a deeper green than the two acres ; and it is to be noted, that, in both the grounds, in those parts which were so early ploughed, no grass appeared during winter, nor at spring to prejudice harrowing.

Of fallow-
ing for
peas.

§. 22. I talked with several very experienced farmers concerning fallowing for peas : they all agreed that their crop of peas would be better if they did, and it would pay the charges, for sometimes their crops were bad for want of it ; but it seems they had
so

so much other work for their ploughs that they could not allow time for it.

To summer-fallow for peas doubtless would be as proper as for barley; in which case you need not stir the ground again, but harrow down the roughness of the furrows before you plough for sowing; your ground by such summer-fallowing, or indeed by an early winter-fallowing, being laid curiously dry, will bear with the sowing the peas earlier than otherwise, which has many advantages.—For this reason it is, that the vale-farmers sow not their peas so early as we in the hill-country do, tho' they lie warmer, because their land is wetter, and consequently colder; but their barley they sow a fortnight sooner than we, for by that time the sun has well heated their land.

§. 23. This year, 1702, happened to be a very dry year, and summer: an old farmer came to me, and lamented his bad crop of peas, and said, they were worth little, and that they were so from his hiring his ploughing, which was of too little strength; for, said he, we had not horses able to go deep enough; if we had strength to go an inch or two deeper I had had treble the crop, for then I had laid them deep enough from the sun.

Of plough-
ing for
peas.

From hence may also be concluded, that the later in the spring you sow peas, the deeper you ought to go.

From what I have observed this year, 1715, it is evident to me, that, if I sow peas in cold clay-ground, I ought to lay the lands round and small, viz. after the rate of five, six, or at most seven furrows in a ridge, whether I sow over or under furrow; for wherever the land lay flat, and pitched, or sunk a little, there the peas failed, and did not come up, and those that did, continued all the summer in an unthriving condition; and yet the spring after they were sown was not so wet, tho' indeed we had often cold

cold dry winds; the ground these peas were sown in ploughed up very mellow and dry, and was summer-fallowed. All these advantages give a plain proof to me of the profit of laying the lands in such grounds round, and I doubt not but where the ground was most healthy, and the peas more flourishing, yet both would have been more so, if managed as above said. The peas, from which I made this observation, were blue peas, sowed so late as the 19th of March, when the cold weather might seem almost over.

On experience I am very sensible, that if peas be ploughed under furrow, inground where one ploughs up-hill and down-hill, very great care ought to be taken that you do not bury the peas; for if the plough going down-hill be not took up, or held up with a good strength, it will be very visible at the time of their coming up; they will not come up half so thick in that half of the land that was ploughed down-hill, as in that half that was ploughed up-hill in every land respectively; therefore, in such land, and especially when so carelessly ploughed, it must be evident there requires good dragging, and very good harrowing, to break and tear the furrows into smaller pieces, and to open them well, and hollow their compact cohesion, so that the corn may come through. Indeed no corn should be sowed under furrow, where the furrow turns up whole, or does not break well into short pieces, but the drags ought to tear such ground first, before it is harrowed; for in such cases the harrows do but scratch the back of the furrows, and when that loose earth is washed away, or settled, the back of the furrows will appear intire and hard. I was plainly convinced of this in sowing peas under furrow in the two former years, but especially in sowing them so this year, 1716. From hence it is obvious, great care ought to be taken in well harrowing the ground, and that they,

they, who go with the harrows ought to be well over-looked. It also seems to me, if ground ploughs rough, so that it may require much harrowing, and yet is so heavy as to be in danger of treading, the best way is to drag it once or twice first before it is harrowed, because one turn of the drags will tear such ground more than three turns of the harrows; and it stands to reason the horses need go over it so much the seldomer, and so the treading will be the less; and it is to be noted farther, that, if a dry season falls out, and such peas, so sowed under furrows, are not harrowed well, they will have the more difficult task to get through.

§ 24. If ground be run to a sword, or run out of the sown grass, and fit to be ploughed up, in case the grete, or mold, is but shallow, and the chalk near the top, I think it is good husbandry to give such a ground, for wheat, a winter-fallow; for then you can take a leisure-time for it; and be sure to take a time when the ground shall be moist, wherein you may go as shallow as you please, and then may stir it to your own mind in summer; whereas, if you fallow such a ground in summer, and the season be dry, as it ought to be, it is odds but you turn up the chalk; for if the ground be dry, there is a loose spongy coat between the first coat and the chalk, which, being hollow, will suck in the plough, so that you cannot help ploughing up the chalk; and this method I believe will compensate very well for the loss of the grass.

§. 25. A field of mine was very well dunged for wheat the summer 1713, and bore a good crop of wheat; in spring 1714, I sowed it to barley, having had a good season for winter-fallowing, as also a good dry season at spring for ploughing and sowing it, and a hot summer, and the barley came up well; yet I do not believe I had two quarters of barley on an acre.—This ground is a strong clay-ground, and

Of winter-fallowing chalk ground that is run to a sword.

Manner of the hill-country in winter-fallowing for barley condemned.

it lies aslope north-east. — I am thoroughly satisfied by experience, that the way of the hill-country-husbandry of ploughing and sowing such ground four years together, that is, to four crops; the first of which is wheat, and the other three spring-corn, for which last three they winter-fallow only; I am, I say, satisfied this cannot be good husbandry for such ground; for the first summer-fallow it receives for wheat, whereby it is warmed, mellowed, and sweetened, can by no means qualify the coldness, heaviness, and sourness it receives the three years afterwards by the three winter-fallowings for spring-corn; nor can, I conceive, any other than the afore-said reason be given, why such land should produce but two quarters of barley per acre, which in goodness and strength was sufficient to bear four quarters. — Therefore such ground should after the wheat-crop receive one or two summer-fallows every other year for spring-corn, before it will be in right temper to receive a winter-fallow for a barley-crop, in order to lay it down for grass-seeds.

Summer-fallowing preferred to winter-fallowing.

§. 26. To plough-in a good sword of grass by a summer-fallowing seems to be of much greater consequence to the improvement of the land than the doing it in winter; for the winter is too cold to ferment it, or to raise and fix those bodies of salt thereby, which lie in those grasses; it being easy to be conceived that the moldiness, and finnowyness of the grass so ploughed-in in summer must be much greater than in the winter; for which reason cow-dung and horse-dung, made in the fields by the cattle's soiling, falling so thin, is not of that consequence some are apt to think, because it never ferments, nor heats.

There is a great nitre and salt in roots, as appears by Grew, wherefore the ploughing-in broad clover-roots, which are so big and thick in the ground, before they are dead, by a Midsummer-fallow, to precipitate

precipitate their rotting or fermenting, whereby their salts are fixed, is of great consequence ; whereas by the insensible decay of the root by canker it is so leisurely done that it has not fermentation enough to raise a good body of salts.

When there is a grassy turf on ground it is observed to bear much the best corn ; the reason of which seems to be, because the grass and roots turned down under furrow do heat, and thereby raise a great quantity of vegetable salts ; for this reason it was I had so great a crop of broad-clover by summer-fallowing it's aftermass, and do look upon it, if a ground has a grassy turf on it, and not too rank or poor for barley, it is best to summer-fallow it for barley ; then to give a winter-fallow for oats, and sow them on the back ; because in the winter-fallow, tho' the grass rots, yet it does not so heat, for want of sun, as to raise from it's rotting such a quantity of salts.

§. 27. To plough a grassy ground in winter, when the snow lies on the ground, or when it is a wet season, is to bring up the weeds ; for the sword of the ground being turned in when wet, lies there fogging, and grows chill, keeping wet all the winter, nor will it easily dry.

Of plough-
ing ground
that has a
sword in
winter.

Farmer Biggs ploughed up a fallow for peas, being a lay-ground with a sword ; he said, he would fallow it as shallow as possible, which was very judiciously considered ; for undoubtedly, if a ground be run to sword, and is to be ploughed against the winter, the shallower it is turned up the more power the frosts will have over the roots of the grass, in rotting them ; and there is no doubt, if the plough should go deeper at sowing-time, but that the fresher earth underneath will turn up mellow.

§. 28. A lay-ground having been sown to broad-clover grass two years, about the 8th of November we began to fallow it ; and the 18th, when they

Of fallow-
ing head-
lands in
strong land.

had fallowed all save the head-lands, my bailiff said to me, that he believed 'twas best not to fallow the head-lands, for, being strong land and grassy, they would at sowing-time turn back again whole, which appeared very reasonable to me; so they were left unploughed. — From hence I do infer, that when grounds are large that are to be fallowed, and are strong lay-ground, it is good to plough round the head-lands at first hand of the year, though the plough should be carried out again for a month or two; there will be time thereby given for the head-lands to rot, that they may turn up mellow when they are stirred again. Nor will the trampling on them when the ground is fallowed dry, do any harm but good; this will make the head-lands sweet, and bear a good bodied corn.

Autumn-fallowing strong grassy ground.

§. 29. I was sensible by experience this year (anno 1714) that, if strong clay-ground have two earths given it to wheat, and after the wheaten crop is taken off, it lies the next summer to grass, and is ploughed up at autumn, tho' such ground be run to a thick matted sword, yet it will turn up rotten and mellow at plough-shear, so as to stir well in the thwarting at spring.

Of the METHOD of ploughing for different sorts of CORN.

Of ploughing wet cold land to one earth.

§. 30. They find by experience in the vale, that it is best to sow wet clay-land on one earth, for thereby the corn lies dry, whereas if they gave it two or three earths, and wet came, it would lie poachy, and cold, and thereby the corn would be chilled.

If lands are to be ploughed up and sowed to one earth, which have lain six or seven years to lain or grass, such ground will turn up with a much even-er furrow, and a great deal more may be ploughed in a day,

a day, in case you plough up the ground the same way the furrow went last.

I was asking the farmer who rented some lands of me, which I have lately taken into hand, how it came to pass, that a certain parcel of ground, which I had sowed to rye-grass, run so much to erishes, it seeming, when the corn was down, almost choaked up with rowety grass. He replied, that those grounds had not been sown for three or four years last past but to oats, which having but one earth, and stiff land, the sword of the grass and the root had not been killed, whereas, had it been sowed to barley, it would have been in as good tilt as any other land.

§. 31. It is plain why ploughing of poor land brings weeds; not only on account that the coulter in lay-ploughing cuts the roots of the weeds in many pieces, all which grow, but also forasmuch as those roots will emit stronger shoots than the corn can, which proceeds only from seed; and consequently, the weeds must over-top, and be more luxuriant than the corn.

Why
ploughing
poor land
brings
weeds.

§ 32. Notwithstanding it was very white ground, I ploughed three earths, and then sowed French-grass and barley in it: I had the evenest and best crop, I believe, that ground ever carried.—I sowed the ground when it was as wet as the plough could well go, which I believe is best for white mortar-earth-ground, which is not on a clay.—The reason why farmers sow white land on one earth, I judge to be from their great inclination to save charges, white earth being more capable of bearing a crop in that manner, as being less subject to weeds than clay-land.—The reason again they offer in argument for so doing is, and from experience too, as they pretend, because they have had worse crops on two or three earths than on one.—The true reason of which is, because they have never sowed such white land

Of plough-
ing white
land to one
earth.

on two or three earths by choice and forecast, but by necessity, that is, when they have been negligent in taking their time for ploughing up such land, and have defer'd so doing too long, whereby it has worked rough; then on force they have ploughed it again, or possibly the third time, to correct the first error, and all in vain, and so have had bad crops; whereas, had they designed three earths from the beginning, and ploughed the first early, and acted uniformly in their second and third earths, I believe, they would not have repented it.

It is usually observed that the white land in our hill-country, if ploughed to two earths, and thereby made light, is very subject to poppy, which we call red-weed, but clay-lands are not subject to it; the reason of which seems to be this: the poppy-seed is an exceeding small seed, (Mr. Ray computes many thousands to lie in a pod) and for that reason is easily buried in clay-land, and less able to shoot it's seed-leaves through, because the clay soon settles and binds; but through white land, made light by ploughing, it's seed-leaves easily pass: it is very likely therefore (the evil of red-weed being so great) it may be better to sow white land on one earth.

There are several sorts of light or white chalky grounds in the hill country, which (when sowed to wheat) ought to be sowed on one earth, otherwise they will be subject to red-weed or other weeds; so that there seems a necessity to give such land but one earth, whenever it is sown; for it will not bear being torn to pieces, tho' it had lain many years to fowd; so care ought to be taken, that such land does not lie down too many years to grass, lest it should turn so stiff and tough, that drags will not rear up enough of the coat or mold to cover the wheat, and so it suffer on the other hand by lying too shallow, and on too stiff a ground. If such ground

ground has lain so long to grass, as to be stubborn, there is a great hazard but it produces the less crop, especially if it be in a gentleman's hands, whose many avocations call him from home, and from a due attendance in the field whilst such land is sowing, it being very likely where much dragging is required, and labour to dress the ground, that servants will be sparing in it, than which nothing can in such a case be more prejudicial; and in all cases, it should be most the care of a gentleman, especially for the reason abovesaid, so to contrive the ordering his ground against the sowing-season, that, if possible, it should be in so good temper and order to receive the seed, that it should not be in the power of the ploughman to hurt him, unless he went wilfully so to do.—Such ground should be so nicked in ploughing up for wheat on one earth, as to turn it up when the furrow is a little inclinable to break, or be rottenish, especially when we may hope it will do so, and grow a little mellow by lying a while to sun and rain.

§. 33. In a burn-beaked ground I sowed barley and French-grass the 18th, 19th, and 20th of March under furrow; the residue of the month was very dry, and warm, but the month of April to the 20th, had every day dry, cold, and churlish winds, and the 17th, 18th, and 19th, there were hoar-frosts in the morning.—On the 20th of this month I viewed my barley, and found most of it looked wan, and some of it yellowish, by the cold winds and hoar-frosts; but there happened in this ground to be a linchet ploughed up in the winter, on which barley had been sown on one earth; this barley, tho' the ground was new, did very manifestly complain, and was quite yellow, which proceeded from it's lying so shallow, and from it's disability to strike roots in the firmer ground of one earth's sowing. Barley sowed on one earth in other places I observed to be

Of plough-
ing to one
earth for
barley.

very yellow on the same occasion; I do therefore infer, that barley sowed under furrow will better bear cold than that sowed on one earth. Part of this white land, over which the sheep had often gone to fold, did not in the least complain; but the leaves kept broadly extended in their full verdure; whereas the others gathered up together, or lost somewhat of their colour. The French-grass sowed in this ground all this while did not in the least complain, or the seed-leaves abate of their verdure.

I find not only Captain Hedges, but Mr. Weston and others make some objections to my over-fondness of sowing my barley always, and my whole crop on one earth; saying, that in hot summers the ears will shrink and want nourishment, by reason the roots cannot strike a depth; but farmer Bachelour of Litchfield will by no means allow this to be an objection, for he says the contrary of this is true, and that in the driest and hottest summers his one-earth-corn flourishes and looks greener than his two-earth-corn. It must then necessarily be, that when Captain Hedges and Mr. Weston, &c. made this their observation, they ploughed their white land either too wet, or too late, when they sowed their one-earth-corn, whereby the frosts had not time to flat it, and shatter it to powder; and so the drags could not raise a grete to let the corn in deep enough.

Farmer Biggs assured me, that he had found by experience, that it was much the best way to sow barley on one earth, if it was poor white land; on such land he was weary of sowing on two earths, being satisfied he had thereby lost his crops.

In sowing corn, as oats or barley, to one earth, in the hill-country, I conceive these to be proper rules, and which I do practise, viz. to plough a narrow furrow (not a wide and broad one) that the winter frosts and rains may have the more power to mellow
and

and shatter the furrows against spring, whereby the ground will harrow the better, and the harrow tinnings go in the deeper. To this end, that the ground may harrow the better, I always take a time of ploughing such ground not only early in the winter, but also in a dry season; and I take care to fence ground so ploughed, during the winter, and till I sow it, from sheep, lest they, by treading it, especially in the wet, should tread down the ridge of the furrows, and make it mortar.

§. 34. I see not why they, who sow wheat on one earth, should sow the earlier, as the custom is, unless on account that the drags cannot raise a deep grete; and so the corn must get an early root, lest it should be too much exposed to the winter: but provided your ground be in very good heart, and the earth mellow, that the drags may, when loaded, enter deep, I see not why such one-earth-corn may not be sowed at Michaelmas.

Onplough-
ing to one
earth for
wheat.

From the observation I have made these three weeks, on wheat now growing (May, anno 1712) I pass my judgment, that wheat, if sowed seasonably, i. e. between the 6th and 20th of September, when sowed on two earths, or on the second ploughing, will carry a better colour about the beginning of May, than the wheat sown on one earth; for the latter, tho' it might seem much the more flourishing, and of as deep a colour during the winter, till towards May; yet the ground sowed to one earth lying closer and harder than the other, the wheat could not move, nor strike so good roots as that sowed on two earths would do; when the spring began to grow dry and hot, it would give off its support to the corn; which will then be apt to turn to a bright and paler colour, and the weaker tillows and branches, which made a show in the winter, will not come on, but starve; whereas the wheat sowed on two earths will, when hot weather comes, flourish

flourish with a deep green, and fulfil all it's branches by nourishing them, it having a depth of mold, and mellowness in it to maintain the roots. From hence it appears how necessary it is to plough deep, where the staple of the ground will allow it, and to lay the seed into a good depth of mold well prepared and shattered by being broke with the plough.

However white light lands, as elsewhere observed, are better sown on one earth; nor can a great crop be all sown in strong land, and on two earths, in cold hill-countries, because it cannot be in that manner sown time enough, and the neglect of that would be a worse evil than sowing on one earth.— I must also observe, that my land, which is more brashy and full of small stones, and of less depth of mold, though better supported with pot-dung than the parts which were only folded, brought less wheat than the other; for which no other reason can be assigned, but that the plough could not turn up a furrow of that depth as in the other part, and consequently the corn suffered by the weather in the summer-months, when it grew dry.— If it be objected to this observation, that barley sown on one earth is generally said to bear the hot summers better than that on two earths, it must be replied, that, when barley is spoken of in such a manner it must be intended of barley sowed on white land, or such light ground as would lie too hollow, if sowed on two earths: of such ground it is true also, that wheat sowed on one earth will endure the summer better than that sowed on two.

Of ploughing to one earth for barley after wheat in the hill-country.

§. 35. It is a common practice, in our hill-country, for farmers, the year after they have sowed light white land to wheat on one earth, to turn it up again early the next year, i. e. in October or November, to sow barley again on the back, or on one earth; and this they do, because such land is poor, and will not answer the expences of two or three

three earths ; and it is a question whether less than three earths would most times make such ground knot fine ; because such white land in our country, being sowed the year before to wheat on one earth, is subject, especially if the summer prove wet, to abundance more rowet and grass than our cold clay-lands so sowed would be ; consequently it would be difficult to destroy it, and to make the couch tear out at the third earth, tho' one ploughed it in early ; therefore they endeavour to feed the rowet with a great stock of cattle as soon as the wheat is off ; notwithstanding which, you will, if you have a good quantity of it, have a hard task to get it eat close time enough for your plough to enter. — I do not approve of this husbandry of sowing such land the next year after wheat, as above said, on one earth to barley, for the reason following, viz. such land is commonly of a shallow grete or staple, and therefore must be ploughed up shallow, and the rowet, which is turned underneath such a furrow, will not rot by spring, but the roots will mat and hold the earth together, notwithstanding the frosts may have considerably contributed to the tearing it to pieces ; — so that, what with the shallow furrow you was obliged to plough, and the closeness of the earth, your drags and harrows will not at spring be able to get deep enough to give the barley a deep, and an easy bed, and consequently the barley must starve in summer. — I do therefore rather recommend such land to be sowed to oats, in the same manner as you would do to barley : oats being sowed a month earlier, will have established a root, and put forth tillows before they are pinched with hot weather, and will better endure to lie shallow than barley would do.

§. 36. It ought to be considered, if we suffer poor shallow ground to run out of tilt, by letting it run too long to grass, it will, if ploughed in summer,

Of one
earth to
wheat.

mer, be apt to spalt up below it's staple; and if, to avoid that, you plough it up in winter, when it is moist, and will plough shallow, in order to sow it to wheat on two earths, poor shallow ground will bear more weeds and less corn being sown on two earths than on one. — The best way therefore is always to plough up such land before it be run to too strong a sword; that you may turn it up to a shallow furrow, and be secure of it's working and tearing mellow under the drags at seed-time, when you sow it to wheat.

Farmer Biggs and his son, both assured me, that though white land did well with wheat on one earth, yet that they had always found it do better with two; but, said they, on about an acre or more of white land, to which this year (1702) we gave two earths, the wheat lies with it's roots out of the ground, there being but a little fibre or two at most that holds the root, and can feed it, so that it can carry no ear; for it is impossible it should have a full-grained corn, where there is so little conveyance of nourishment to it. — I asked farmer Biggs how that part of the white land sowed on two earths came to be so much worse than the rest. He said, because the land was side-long, and had a falling both ways, so that when at sowing-time they ploughed it up and down, one land having another falling against it, every other furrow, falling with the side-land and not against it, filled up without a seam, so that, the land working fine, the corn could not be buried. — The best way is, said he, to sow white land on two earths, and to sow the last under furrow.

But I have since found by experience, that, tho' two or three earths may be best for wheat on strong red clay-ground, (red-weed not being so apt to grow in that, tho' made never so fine) yet that either two or three earths is very improper for white light ground, or half red earth half white; for the finer
such

such ground is made it is so much the more subject to red-weed, or poppies, especially if the summer prove cold and rainy, as in 1715.

The farmers of our hill-country say, they have found by experience, that it is best, when they sow wheat on one earth, which is always done early, to sow old wheat rather than new; because the old wheat is not so forward, and apt to run away to a grassy head, nor to be so proud as the new, which are faults at the forehand of the year. — This seems reasonable to me.

§. 37. Farmer Lake advised me by all means to give two earths to my peas: he said, if my land was like his, or the land about them, he was sure I should not often have a good crop on one earth. — Quære about this. — Farmer Biggs says, if it be lay-land, it will not come in tilt at two earths, but will turn up whole, and, if it be barley or oat-stubble, it will not need it; but he allows, it may be good practice as the ground may work, for sometimes such stubble-land may not work kindly under two earths. Farmer Elton afterwards told me what Biggs said was true, but it was upon land lying still a year or two that two earths was such good husbandry, and in that case it would come to tilt at two earths.

§. 38. If you give some of your wheaten lands three earths, if strong clay, it will turn much to advantage, but then such land must, if run to a sword, be fallowed in winter; otherwise the grass will not rot soon enough to be stirred: in such case you need not doubt of being able to stir such fallows in the driest time, when you cannot get the sll into the grassy grounds you would fallow: by this means you will be able to cut out work for the most precious time of the summer, when farmers lie by, because they cannot easily plough by reason of the hardness of the ground.

§. 39. The

Advantage of
three earths
to summer-
corn.

§. 39. The advantage of giving three earths to summer-corn is in this very manifest, viz. that in a dry spring and summer, in any part of a ground that works rough, for want of making the earth fine by so much ploughing, in that part the corn will come up edge-grown, and later than the rest of the same ground where it worked finer, and apparently thinner in straw, and shorter in ear, as was visible anno 1704 in most grounds, which might have been prevented by giving three earths; -- for if the corn in ground working rough comes up the later, it is consequently the backwarder, which is a great disadvantage in our cold hill-country, where it is of the utmost consequence to have our corn early ripe.

Custom in
Leicester-
shire, and
of the
worm there

§. 40. In the inclosures in Leicestershire, where the land is fresh, the way is to have four successive crops without either dunging or folding; and then to lay down to grass, laying pot-dung on the last stubble: viz. they take three crops of barley and one of wheat; they harrow always on one earth; and plough not up for barley till January or February. -- Because as I suppose, the land being deep, would be apt to run to weeds, on longer rest, before seed-time. -- In these inclosures they never take a wheaten crop first: it seems in fresh broken-up ground both the wheaten and the barley crops are subject to be eaten by a worm, as the wheat in the Isle of Wight: to prevent which Mr. Clerk eats the grass as close as he can, for that being turned in, as he thinks, occasions the worm.

Of stirring
poor land
early for
wheat.

§. 41. The workmen that were flinging out dung for me said, I might stir my land in the last stirring three weeks or a month before I flung in my wheat, and this was a frequent practice. I talked with an old experienced farmer about it, but he seemed by no means to allow it for poor land that had been often ploughed; for it would, by giving it it's last stirring so early in the year, be apt to

run

run abundantly to weeds ; yet, said he, for fresh or lay-land it may do very well.

§. 42. I observe many farmers scruple stirring their ground before seed-time (the success whereof ^{Of stirring land.} nevertheless they doubt of without it) either out of covetousness, or a fancy of not having leisure to do it then, tho' at such times teams may be hired ; and yet at seed-time, when time is ten times more precious, they shall bestow the same time in harrowing it, by reason of it's roughness, and, after all, the ground shall not work so well, nor lie down so fine as it ought to do.

If you propose to sow the ground you fold for barley the last in the season, have a regard to the stirring it, especially if it be a ground any wise inclinable to grass, for it is not to be supposed but the winter folding has established such a root of grass, by enriching it, as is not to be overcome by ploughing up the ground, after being fallowed so late as the latter end of April or May, by which time the grass must have gained a good root, which will not easily be torn asunder from the earth by harrows, and consequently will be apt to grow, and the ground not to work fine.

If you summer-fallow for barley, it is best to stir about two months before seed-time, to kill the roots of the green weeds that are come up, by turning them up to the frosts, and burying their leaves and stalks ; besides such ground, being so thoroughly mellowed by the summer-fallow, is so separated in it's parts, that it will not easily fall close and heavy before seed-time, tho' stirred two months before. — But if you have winter-fallowed for barley, and intend to stir, if the ground be still stiff, you should stir the earlier to mellow it with the frosts ; but if the ground be pretty fryable before stirring, the later you stir it the better, for then it will break the smaller at seed-time, having the less time to settle ;
and

and true it is, with the ancients, that land cannot be too fine for barley.

If ground, by spring-stirring and summer-fallowing, be made curiously mellow for barley at seed-time, tho' it will wet sooner than barley-land that has had but one fallow, so it will also dry vastly sooner; and if it be trampled on wet by the horses, yet the ground being so fine and mellow, the corn will come through; whereas when ground works rough and wet, the unbroken clods bind and cover in the wet, and keep the corn cold and wet all the summer, nor can it come through, but lies cold all the summer; besides, to work ground rough and dry at seed-time, tho' by much harrowing it may be made fine at top, yet it is to be considered, the corn has not a mellow soft bed, much of the land being buried in whole clods, as has been observed by the ancient writers on husbandry.

A neighbouring husbandman carried me into his wheat, and shewed me three or four lands that he had stirred, whereas to the rest he had given but two earths: the wheat he had stirred was as good again as the other, both in colour and thickness; the reason why stirring might be so serviceable was, that, when two earths only are given, the earth turned up to the sun in the first fallow, and thereby mellowed and impregnated, is for the most part turned down and buried underneath the corn that is sowed at the second ploughing, but on the third earth, it is sown again turned up to the surface whereon the corn is sown.

Of striking
furrows
after har-
rowing
wheat.

§. 43. The design of striking furrows after harrowing the wheaten land, is to strike the corn out of the furrows, wherein the corn generally dwindles, as as being chilled; to do this, when the fold is after to go over it, is needless, because the sheep tread it in again; but after the fold has run over it, it may be done.

For

For want of drawing a furrow after harrowing in of wheat the reapers at harvest are at a loss how to measure, and for a guide to work by.

§. 44. Wet clay-grounds, that lie wet and foggy all the winter, will chop and grow starchy all the summer, so that they will have peculiar infirmities in all seasons: in my opinion, abundance of, and very thick trenching of such lands will be a much cheaper, and more effectual improvement of them, than dunging; but indeed no improvement can have effect before they are laid dry.

Of trench-
ing wet
ground.

Of the TILLAGE of different LANDS.

§. 45. *Mr. Hillman, a notable farmer at Thruxton, was against my picking up of stones, and said, it was certain ground would fall finer under the plough which had most stones. To which I answered, that it was true, lay-ground, or grassy ground, would break better on the first ploughing (at least if the ground was wet) the fuller it was of stones; for such ground cannot so easily cling, nor bind when ploughed up, because of the great number of stones; but ground, that has no stones, will be made to work as fine at three earths, as the ground that hath stones, and will plough with a much narrower and finer furrow standing upright and on edge than the stony ground will do, the furrow whereof must be carried broad, or else the tumbling of the stones will fill it up.

Of plough-
ing stone
land.
* Vid. p.
87. §. 1.
Of picking
up stones.
Argu-
ments
against it
answered.

§. 46. Quinteny says, to dry earths I allow a large culture or tillage at the entrance of winter, and the like as soon as it is past, that the snows and rains of the winter and spring may easily sink into the ground; but to strong and moist earths I allow but small tillage in October, only to remove the weeds, and stay to give them a large one at the end of

Different
tillage of
dry and
moist
earths.

April, or beginning of May, when the fruit is perfectly knit, and the great moisture is over.

Of plough-
ing husky,
loose earth.

§. 47. If ground be of a husky, wood-seary nature, in the parts of which is not a fit continuity, in such earth there is a porous adhesion, through which both cold winds and the sun may penetrate, and in which, being of a spongy nature, as light as it seems to be, the water will lie and chill the ground, as it does also in healthy grounds; to cure this evil, and bring it to a more solid body, the more you plough it the closer it will lie to the roots of the corn, and become more solid, being also rolled, or rather trod with sheep; for if in clay-land, notwithstanding the great room a post takes in a post-hole, the same earth will with ease be rammed in the same hole again with the post, and even more if need were, because in the digging it up the earth is broken into minuter parts, how much more is the husky land abovementioned so broken by ploughing; it being much more porous, and capable of being forced into a compacter and closer body in it's surface the more it is broken by the plough, and then trod with sheep, or rolled; whereas the roller, or sheep, if it be sowed on one earth, will not be able to compress the clods, nor squeeze the earth close in the hollows.

Of the MANNER of PLOUGHING.

Of ridging
land.

§. 48. I observed this year, 1711, it having been a wet and cold spring, that wherever in my clay-lands there was a little sinking of the ground, on those flats there was little barley, and that thin in body, the ground being too wet for barley: from hence it seems to me, it would be very good husbandry to ridge and round up all the grounds that are cold clay on our hill-country, where the land is of depth to bear it; for, as the delving parts of the grounds

grounds are much too cold for barley, so the very healthy and driest parts of cold clay would be the kindlier for barley, especially in so cold a country; whereas throughout this hill-country we all plough the grounds upon the flat, and thwart the furrows in stirring. It seems also to me, that this very good effect may proceed from such ridging up the lands, viz. that the lands will on that account plough so much the drier and mellowier in fallowing, and consequently will at seed-time, (by turning up dry in fallowing) turn up dry and in powder; whereas, when the lands in fallowing are laid flat, they take in the wet, and lie wet all the winter, and when they come to be stirred at seed-time, they turn up too wet and cold for barley.

§. 49. There is a practice in husbandry of giving the last ploughing to grounds some time before sowing them; which is, when ground is not in a proper temper for sowing in the seed and harrowing; this is done when persons have a great deal to do, but, wanting a season, they would prepare their grounds against one may happen; but this practice commonly meets with very different events in wheat, or winter-corn, and in lenten or spring-corn; for winter-corn, when prudently done, it is very good husbandry; but seldom so, when practised for spring-corn, for the reasons following. The reason of doing it for wheat is, because the season of the year being far advanced for sowing wheat, and the land too dry to venture the sowing (for wheat is seldom long hindered from sowing by wet) the husbandman gives the last ploughing in order to sow wheat, that on the first rain he may commit the seed to the ground, and then harrow-in several acres in a day; whereas were he to plough for what he sows he could dispatch but little in a day: it is apparent this practice may be very good husbandry; for the ground in this case is supposed to be ploughed very

Of plough-
ing some
time before
sowing,
not good
for spring-
corn.

dry, and consequently a fine bed, by breaking the ground with the plough, is not prepared for the growing of the seeds of weeds; for no seeds of weeds can make advances to get the start of the corn till rain comes, and then the wheat will be sowed, and be able to set forth as forward as the weeds; and hereby, when we are behindhand in sowing our crop of wheat, much time is gained; which is a great advantage to a crop of wheat; but in the other case, ploughing beforehand for barley, or spring-corn, in order to sow it when a season comes, or the ground is in temper, must in all likelihood be improper husbandry; because, generally speaking, we must in such case be supposed to plough beforehand, because the ground was too wet or too moist for sowing barley, and then, a bed being prepared, and the spring and warm time of the year being advanced, the seeds of weeds will grow, if the ground were ploughed never so dry, yet if a glut of rain should come, which will hinder you from sowing, it will nevertheless make the weeds grow.

Of laying
the fur-
rows flat in
the hill-
country.

§. 50. Mr. Edwards asked farmer Biggs, if he had not laid his ground too flat. Note, he had sown it to wheat.--Farmer Biggs replied, considering what sort of ground it was, it could not be too flat, it being a lightish sort of ground.—I asked, whether it was possible to lay wheaten ground too flat in the hill-country of Hampshire; farmer Biggs replied, if it was clay-cold-land, they looked on it best to round up the furrows a little,—and so said Mr. Edwards.

Mr. Garnam, of Prior's-court, Berks, was also of opinion, that, if ground was any ways wet and cold, laying it a little round for wheat not only favoured the corn in laying it the healthier in the winter, but also, when the spring came, by lying healthier it would lie so much the warmer, and shoot away, tho' the spring should prove wet and cold, and thereby avoid the blights the better; for
laying

laying corn dry forwards is as much as sowing early.

It is the heat and warmth of the earth, occasioned by the sun and dry weather, that opens, loosens, and refines the vegetative parts, and causes them to breath up in steams into the plants; nor does the earth want moisture for such a purpose, provided it hath just enough for a vehicle sufficient to convey those corpuscles; therefore all cold rains, or rains in cold weather, or wet fogging in the earth, are great enemies to that vegetative power, and do chill, check, and lock up (instead of loosening) those corpuscles from ascending up into plants, to the augmenting their bulks; from hence it may be collected, how reasonable it is to lay the furrows of wheaten clay-lands up round, tho' they are in the hill-country; but, if they should lie at all flat, yet so to contrive that they may not lie wet, longer than needs must be, under the cold winter or spring rains.

Lands being made very fine for wheat ought to be sowed the later; because, if early sowed, many seeds of weeds, more tender than wheat, and too tender to grow at the latter end of September, will grow at the beginning of that month; and the bed of earth you have made so fine and fit for corn, will, you must conceive, be also fitter to bring up the seeds of weeds; and the later you sow your wheat, if upon strong land especially, the more need is there to lay up your lands somewhat round, tho' the clay be of a healthy dry nature; for the drier the land lies the faster the corn will come away, and keep growing the better during the whole winter, it lying the warmer for lying dry; whereas cold and wet are certain enemies to vegetation.

§. 51. Mr. Edwards was saying to me, that it was a great error to turn up too large a furrow, and that ploughmen, that they might be thought to have done a good day's work, were very apt to do so,

Of large furrows.

whereas it was more profit to turn up as narrow a furrow as they could, tho' less land were ploughed.— Of this I spoke afterwards to farmer Biggs; he said, it was true; the smaller the furrow the better; but in lay-land, if stiff, it would not turn up small, but stand an-end, if the ploughman endeavoured to turn it up small; but, said he, in oat-stubble, or barley-stubble, that work light, the smaller the furrow the better.

Mr. Edwards having told me, that it was a great fault in ploughmen, out of greediness to seem to have done much, to turn up large furrows at seed-time, and it seeming good reason to me, because, the more and narrower the furrows the more the corn, the corn coming up for the most part in the furrows. — I asked also Thomas Elton about it, a very understanding husbandman, and he said, he could never for his part see the sense of fallowing, and taking pains all the year, to lose a third or fourth part of one's crop at last by a large furrow. — I asked him then, what furrow was best in fallowing; he said, if ground worked fine, a large furrow would do well and turn up small enough at it's second earth; but, said he, if it fallows up heavy and rough, and be turned up in a large furrow, it will not be brought to be fine by seed-time; therefore such land ought to be fallowed with a small furrow.

Quære, If the narrower the furrow in fallowing of stubble ground would not be the better for barley, as well as in the last ploughing in sowing-time? because the narrower the furrows the more power the frosts and dry weather would have over them, and the more upright the more hollow they stand; whereas the broader the flatter, and more apt to receive wet, and the more the furrow holds in breadth the less does it break. I know in whole land, that is grassy, it is otherwise, for, if such land be designed for a fallow, unless one furrow flap over the other, the

the grafs will live between the furrows, and not rot, and if fuch land is to be fowed on one earth, if the furrows lie upright, the corn muft fall between.

I ordered my head-ploughman to fallow for barley in a field, which being proper to be ploughed the fame way again, as I fallowed it, I thought it might not plough fo fine at fowing it, as if I had thwarted it; fo I gave him a caution, not to fallow it rough, but to turn up a little furrow. ——— But he faid, a large furrow would be beft, becaufe that will be fplit or divided in feed-time, but if he ploughed a fine furrow now, and ploughed the fame way at feed-time, a narrow furrow could not be fplit in the middle, but turn back again whole.

I was fowing barley on wheaten-fallow, and, as you plough up-hill and down, the plough alfo goes along-side part of the hill; as I was in the field obferving this ploughing, my bailiff faid, the plough going on the fide-long could not carry fo narrow a furrow as otherwife it might, for, if they fhould go to plough a very narrow furrow, they could not hold the plough in, but the hill-side would be often cafting it out; on the other hand, when the plough turns, and the broad board goes againft the fide of it, it is as hard to keep a narrow furrow, the hill being apt to fling the plough off.

Of PLOUGHING with HORSES or OXEN.

§. 52. My carter fays, that wherever one ploughs stiff land, or lay-land, or hilly land, it is cheaper to maintain fix horfes, and drive them in the plough, than four; for, fays he, four cannot be fupposed at moft to plough above an acre in a winter's day, and fix will go away fo faft with it (it being fo much eafier to them) as to plough near an acre and half per

Stiff land
ploughed
cheaper
with fix
horfes than
four.

day ; and then besides the horses need not that proportion of oats, their labour being easy. A farmer stood by and said, he believed the same ; if so, the two horses will well pay for their keeping.

I summer-fallowed for barley, and hired a farmer to fallow with four horses, and I fallowed myself with other four ; but the season being very dry, and the ground having laid two years to broad-clover, and being stony withal, I found they made but a slow riddance, infomuch that I believe, a plough and six horses would have ploughed as much as those two ploughs ; and besides, they, by being weak, were forced to plough the ground scragling, inasmuch as the ploughman was forced to wriggle with the plough where the fall stopped at any stones, to help the weakness of the horses, by means of which we could not hold a steady and even furrow neither in breadth nor depth ; and as his plough did consequently often jump out of ground, so he was at a great deal of pains and care to get it in again ; whereas a plough with six horses goes through thick and thin, and will carry an even furrow by flinging and forcing up all stones in it's way ; so note, against the next time, in like case, the advantage of ploughing with six horses.

Advantage
of oxen.

§. 53. One advantage in a team of oxen is, that one of the men who go with them may go about other business when ploughing hours are over, for one man is abundantly sufficient to look after six oxen.

Mr. Baily of Wiltshire very strongly persuades me to keep a plough of oxen together with my horse-plough : he confesses an ox-team cannot go to market, in a country where horse-ploughs are kept, because of the ruts they must tread into, but for carrying out dung into the fields, ploughing, and harvesting, they will do as well as horses. He says the shoeing of an ox round, comes to 16 d.— but if the
inner

inner hoofs behind are not shod, (which in our country they need not, not going on the roads with them) four oxen in shoeing are but the price of three. He says they will endure eight hours ploughing in the day, in winter, with straw only, till towards Lady-day, and then they must have hay; and if they are kept up, they will go as fast as a horse-plough. And he says, in the very winter they may be turned out into the backside to straw after their day's work, and will not take cold; but I believe in our country such usage would be too cold: Mr. Biffy was present, and agreed to all this, — and both of them held, that, if fatting oxen stalled were over-bound in their bodies, which by being kept hot they might be apt to be, they must be turned out to the air, for, whilst bound, they will not thrive.

An advantage of ploughing with oxen is, that you summer-fallow the strongest lands with them in the driest season (their chains being strong) by making a plough of ten oxen, and adding a ploughman the more to hold down the plough; whereas, if at such time you make a plough of eight horses, they will not carry so true a furrow, and will break their harness.

H A R R O W I N G.

§. 1. **T**HE Romans, after the several fallowings before mentioned, sowed their grain, and, if they found occasion, harrowed it, and then, as it seems to me, turned it under furrow, tho' I do not remember that any of their writers speak particularly of sowing under furrow, or on one earth; I think they are silent in these matters. When this was done, and the corn was come up, they proceeded to another operation, which they called farrition, a kind of harrowing or raking with wooden

Of the farrition of the anti-ents.

^a wooden or iron rakes, for they are both either mentioned or intimated by Columella.—^b This sarrition was performed in dry burning lands before the winter came on, and then they covered the blade intirely by raking the new earth over it, taking however what care they could not to wound or mangle the roots.—This, they thought, protected it from the cold, gave it fresh nourishment, assisted it in it's growth, ^c and made the roots tillow and spread.—When the rigor of the winter was over in January, according to Palladius, and in February according to Pliny, and in dry but not frosty weather) they raked it a second time, in a slighter manner, or a different way;—^d But in cold wet land they used only the spring sarrition, raking the earth so as not to bury the blade, lest the young suckers or tillows should be thereby destroyed.—^e The great use of this later sarrition was thought to lie in it's loosening the ground which had been bound up by the winter's frosts, and thereby giving an easier admission to the rays of the sun.—They made it a rule however, let the season be never so favourable, not to use this husbandry^f, till the corn was grown to that height as to equal the

^a Ligneis rastris sarriendus. Colum. de medicâ—Ferro succisa emoritur. Id. de lupino.

^b In agris siccis et apricis, simul ac primam sarritionem patiqueant segetes, debere eas permotâ terrâ obrui, ut fruticare possint, quod ante hyemem fieri oportere, deinde post hyemem iterari.—Sic fieri debet ut ne radices satorum lædantur.

^c Ut latius se humi frutex diffundat.

^d In locis frigidis et palustribus plerumque transactâ hyeme sarriri, nec adobrui, sed planâ sarritione terram permoveri.—Cum pullulare desijt frumentum, putrescit, si adobrutum est.—Columella.—Qui sarriat, caveat ne radices frumenti suffodiat.—Plin. lib. 18.

^e Sarculatio induratum hiberno rigore soli tristitiam laxat temporibus vernis, novosque soles admittit. Plin. lib. 18.

^f Cum sata sulcos contexerint. Columella. (Sulcos æquant sata. Virgilius.) Triticum sarritur quatuor foliorum, hordeum quinque. Palladius et Columella.—Faba et cætera legumina cum quatuor digitis a terra extiterint. Columella.

tops of the furrows.—Wheat was thus harrowed when it began to have four leaves, barley when it had five, beans, and the rest of the leguminous kind, when they were four fingers high.—The earlier farrition would by no means be proper in our wet climate; * and indeed this method of husbandry, both of the earlier and later kind, tho' in frequent practice among the Romans, was thought by many to do rather harm than good, inasmuch as it often wounded the roots of the corn, or laid them bare to be killed by the frosts.—When their farrition was finished, they pulled up by hand the weeds that these harrows had left remaining, and this they termed runcation.

§. 2. Mr. Hillman being with me, when I ordered the smith to make tinings to my drags, he persuaded me to have the tinings steeled, assuring me it would five times over-pay. — Qu. why not steeled tinings to harrows?

To steel the tinings of your drags.

§. 3. It is some disadvantage that oxen will not make any great dispatch in harrowing, nor will the slow manner of their drawing the harrow about do great service, if the furrow tear not easily; for the harrows drawn slowly slide over the hard earth; whereas, when drawn apace by horses, they jump, and whatever the tinings or teeth catch hold of they tear through; but in mellow rotten ground, where the harrows easily enter, there you may make good work with oxen.

Of harrowing with oxen.

§. 4. Sometimes in dragging-in of corn, especially by oxen, where the chain, which is fastened to the drags, may be taken up and shortened, as the ox-hind pleases, if you have not an eye to your ox-

Caution against the fraud of ox-hinds in dragging.

* Quidam negant eam quicquam proficere, quod frumenti radices sarculo detegantur; aliquæ etiam succidantur, ac si frigora inceserint post farritionem, gelu frumenta enecentur. Subjungenda est deinde farritioni runcatio.

hind,

hind, he will be apt to shorten his chain so, that it shall lift up a row or two of the hither or fore-tinings, and so but a small weight will lie on the hinder row of tinings, whereby the drag will, for the most part, be born up from the ground, so that the first row, and it may be the second, shall not enter the ground, nor the hindmost row go deep enough; and this the ox-hind will do, if not well looked after, for the ease of his cattle; because they draw abundantly less weight, when the foremost rows of tinings are lifted up from the ground, than when the chain the oxen draw by is so lengthened out, that every row of tinings may lie plumb and flat on the ground, and have liberty thereby, not being held up, of sinking in the deeper; whereby the corn is also laid the deeper, and the ground torn the better: the ox-hind's ill practice in favour of his cattle is ruinous to the master, and therefore servants are to be well looked after: an hundred pounds by this abuse may soon be lost in an hundred acres of corn sowed on one earth.

What
number of
harrows
best for
stiff land.

§. 5. Where land has been summer-fallowed for barley, two harrows will harrow it as well as four harrows will harrow land winter-fallowed for wheat.

It is agreed, that three harrows will do more service than four going two and two, for the third harrow contributes much by it's weight in keeping down the other two.

Manner of
harrowing
stiff land.

§. 6. If furrows be starky and stiff, so that there may be danger of turning them back again, in thwarting them with the harrows, if one harrow them not directly athwart, but aslant, that danger will be prevented.

Caution
against
harrowing
too wet.

§. 7. It is to be observed in harrowing, tho' the ground may harrow well enough at top, whether it may not be so wet underneath, as for the horses to tread the seed in too deep, and into such paste and mortar, that it cannot shoot it's blade through.

It

It is a common piece of ill husbandry, when the spring-season of sowing proves wet and rainy, and there may be a ground under harrowing that may want but the last tining or two, (perhaps an hour's, or but half an hour's work of being finished) when a hard shower of rain shall come, and the ground harrows wet, to continue harrowing, out of covetousness of finishing that ground, and unwillingness to leave so little behind undone, and to come again to that ground, when the next work they are to go upon lies perhaps a mile, or half a mile off; but servants should have most express charge given them, as a general rule, at the beginning of seed-time, immediately to stop and desist harrowing, if the ground harrows wet and dauby, especially in clay-ground; for, tho' the ground harrowed never so well before a shower of rain came, yet the taking one turn more with the harrows, while the surface is wet, will make it crust and bake so, that if dry windy weather come, the corn will have a difficult passage through.

§. 8. I sowed a field anno 1703 with oats, having fallowed it very early; the winter proved wet and rainy, which beat the ground very flat; but, being in good heart, it was apt by sowing-time to shew grafs; and particularly in the bottom of that ground, that being very stony, as well as beaten flat by the great rains, the harrows could not raise * a grete; therefore, tho' in the hill-country such grounds are the best, yet that bottom brought me more grafs than oats; wherefore it is to be remembered, that such bottoms be ploughed up again at seed-time, and care ought always to be taken, that such bottoms lie light, when to be sowed, that the harrow tinings may be let in.

Of har-
rowing
stony bot-
toms.

* mold or
staple.

I had wh at anno 1706, which I sowed on one earth, and tho' the bottom of the ground was as good as any of the rest, yet the wheat was not above half as good, neither as to thickness, nor the proof it was in: the reason

reason must be, because, the bottom of that ground being very stony, the tinings of the harrows rid upon the stones, and so the corn was never well healed.— Therefore, when such grounds are sowed with wheat on one earth, I advise that the stony bottoms be ploughed some time before, so that they may come to be thwarted, and sowed under furrow, when the other land is ploughed and sowed to one earth.

Much har-
rowing, no
cure for
ground
ploughed
rough.

§. 9. I can see but little cause for the satisfaction the farmers seem to have, in fancying if a ground works rough, that fault may be cured by much harrowing; for thereby the lumps are buried, and, for the most part, the corn under them, there being only a fine smooth mold gained at top, by the scratching of the harrows.

To drive
sheep over
wheat
raised out
of the
ground by
harrowing.

§. 10. Having harrowed a field of my wheat, and endeavouring to give it three or four tinings more, in order to fine off some of the rougher part, they brought up a great deal of grain, that in three or four tinings before they had buried: I advised with farmer Biggs, and proposed to rake them in: he said, the best way by much, and in such cases they used, was to drive their sheep over the ground, which would prick them in.

Of har-
rowing
peas.

§. 11. It is best to let the furrows lie three weeks or a month, after sowing peas, unharrowed; the furrows keep the cold and wet from the corn; whereas, if by that time the peas be rooted, they will not have sprouted out, and then the harrows will not hurt them.

Of drag-
ging.

§. 12. In talking with a notable farmer in Wiltshire on the subject of sowing broad-clover with oats, he told me, he always dragged them in with their country drags (which are not so big as ours, and have but six tinings on a harrow) and this he does, tho' his ground had been ploughed up but a fortnight before; but he commonly sowed broad-clover on ground ploughed so long before as Candlemas, which never

will,

will, tho' it works mellow, fall too close for the drags to tear it. — Here note, if dragging does so much better with them than harrowing, even in ground that would, as we should think in Hampshire, tear well with harrows, it must do better with us, because we do not plough so deep as they do in Wiltshire, nor will the tinings of the drags go so deep with us as with them, on account of the stones, and so we can be in no danger or fear of burying oats or barley. The farmer says, he sows very little or no barley without dragging it, and the like he does to wheat too after he has sown it, tho' on a second earth; nay, he often drags the ground once, when ploughed the second time, before he sows either wheat or barley, in order to break the furrows and the seams, that the corn may come up the more * suant; and on the backs of the furrows, which * kindly. are dragged after the corn is sown, there is no fear but the drag-tinings will let it in deep enough. — To make wheat come up more suant, when sown on one earth, or on stale fallows, he always drags it first, before it is sowed, and then gives it two or three tinings, and says, there is no fear but the drag-tinings will let the corn in deep enough. — This method of dragging wheat and barley land, in any of these respects, before you sow it, saves seed: for you may sow less on an acre. — It is a general fault in Hampshire, that, having so much to do, we flubber it over without dragging when it ought to be dragged, and content ourselves with only harrowing the ground, and, when we either drag or harrow, we do not bestow labour enough on it in either respect.

PICKING UP STONES.

Advantage
of picking
up stones.

Vide §. 45.
Of plough-
ing.

† mold or
staple.

§. 1. **T**HE advantage of picking up stones in clay-land is, that, the stones being picked up, the ground harrows much the better; the number of stones and their bigness bearing up the harrows from reaching the † grete, and making the ground plough rugged; nor can a weak plough turn it up but to great disadvantage, every stone being a harrow-rest; besides, to plough such ground true, there must two men go with the plough, for a man and a boy are not sufficient, it being too tiresome for one man to hold the plough all day, a man's weight being necessary to keep the plough in the ground.----It is to be noted that, where ground is trod much by cattle, especially that part of it that they go most in and out on, or where carting has been, the ploughing is very stiff.

The better raking up the barley is another motive for picking up the stones to be added to the former.

Another advantage of picking up stones is, that thereby the plough turns up fresh earth by going deeper: the very weight of the stones (where there are many) contributes to the settling and binding of the earth to great prejudice after rains.

The advantage of picking up great stones at least appears from the inconvenient rolling of wheat in March or April; for the roller is always riding on one stone or other, which it cannot squeeze in, and in that case, is born hollow throughout it's whole length from compressing the ground.

Another advantage of picking up stones is, that, if it be clay-lay-land, and ploughed dry, which for wheat is to the advantage of the land, the plough-beam, sprinter, whippings, and traces must often break when they come against a great stone, as my
neighbour

neighbour experienced this summer (anno 1704) who said, they broke in one piece of ground as much plough-tackle (even their beam, tho' new, &c.) as came to the value of every day's work.

Another advantage of picking up great stones in arable land is, that a less roller, with fewer horses, will roll the ground in seed-time.

Another advantage of picking up stones is, that, at a day's notice, one may take the advantage of the times in haying up for mowing, after one has waited for the fattening cattle on one's land, and found by the markets rising they must be bought in too dear; but, if an hundred load of stones must be first picked up and carried away, it will render the method impracticable.

§. 2. To pick up stones from poor land, continued in that condition, I look upon rather to be impoverishing than improving it; for thereby you rob the poor land of it's only dependence, which was being kept moist; for, if such ground has not moisture to bring up the corn, it must fail, having no strength; of rich land I believe just the contrary, and that such abundance of flints, which lie so thick, or are so broad as to keep the dews and the sun from impregnating the ground, must needs be to it's prejudice.

Not to pick up stones from poor land.

If a multitude of small stones lie on light white ground, the evil whereof is being subject to be too light, it seems good to let them remain, that the weight of them may compress the ground together (for which reason they are prejudicial to clay-land) and wedge themselves with the ground, which secures it from burning, &c. — But great stones are every where pernicious. —^d In Sicily, near Syracuse, says Pliny, a farmer, who was a stranger to that

^d In Syracusano agro advena cultor, elapidato solo, perdidit fruges luto, donec regessit lapides. Plin. lib. 17.

kind of land, and to the manner of husbandry in those parts, lost his crops by picking up the stones, and found it so great a disadvantage to his land, that at length, to retrieve his damage, he thought it adviseable to bring them back again. — The ground was light there, and, I suppose, they had not the use of rollers in those countries; nor do I find that Cato, Varro, Columella, Palladius, or Pliny, make any mention of a roller for their lands, but only of a cylinder to roll their earthen barn floors hard, and a crates, or flat frame of timber, to draw over their corn, and level their ground.

Stones hinder wheat from tilling.

§. 3. Quære, whether an abundance of stones in a ground may not hinder the tilling of wheat at spring, by bearing the root off from the earth, and hindering it taking fresh root, and not suffering the roller to press it to the earth.

Keep the roots from the benefit of the sun.

§. 4. To the disadvantage of stones in grounds may be added, that though the corn under them comes up, yet, where the root is hindered from the sun, such corn must be thin; and, when corn lies under stones, shaded from the sun, I suppose it not only to be thinner in grain, but shorter in ear, and to carry less and fewer tillows under the stones than if exposed to the sun and air.

Nor in the bottoms, where so many stones generally lie, do the sown grasses, such as clover, &c. come to any thing, tho' the ground is allowed to be much the best: if such a ground of twenty acres has such a bottom of two or three acres, and it should cost ten pounds ridding the stones, the advantage to the clover in those two or three acres would, I believe, pay the whole charge.

SOWING.

S O W I N G.

§. 1. **T**HE best seed, says Pliny, is that of a year old; if you keep it to two year o'd it is not so good, but if to three, it is worse still, and if it be older than that, it will not grow. ^a Of choice of seeds among the ancients; ^b For seed you should choose the heaviest corn, and fullest ears, and set them apart in the barn, and by no means admit those ears that are not full throughout, but have only grains here and there by intervals. Note the curiosity of the ancients, and it stands to reason; it is in danger of producing such ears.

§. 2. ^c Pliny directs those that sow early to sow thick, as the corn will be longer in coming up; and the later sown corn, he says, should be sown thin, lest it should be destroyed by coming up too thick on the ground: but surely he must mean this of the spring-corn and not the winter-corn, for the direct contrary rule holds in sowing wheat. ^d Quantity on an acre;

§. 3. ^e According to Cato, cold wet land should be sown first, and the warmer and drier ground be reserved to be last sown.—This he must mean of a winter-crop. Pliny and Palladius give the like rule: see also a subsequent remark of mine on a passage in Columella. ^f Time of sowing;

K 2

§. 4. In

^a Semen optimum anhiculum, bimum deterius, trimum pessimum, ultra sterile. Plin.

^b Ad semen reservandum est quod gravissimum: quæ spica per intervalla semina habet abjicietur. Plin. — Quæ seges grandissima, atque optima fuerit, seorsum in arena secerni oportet spicas, ut semen optimum habeat. — Varro, sect. 56.

^c Festinata satione densum sparge semen, quia tardè concipiat, ferotinâ rarum, quia densitate nimia necetur. Plin.

^d Ubi quisque locus frigidissimus, aquosissimusque erit, ibi primum serito; in calidissimis locis sementem postremo fieri oportet. Cato, sect. 34. fol. 8. — Sationem locis humidis celerius fieri ratio est, ne semen imbre putrescat, siccis serius, ut pluviae sequantur,

§. 4. ^e In the month of November, says Palladius, we sow wheat and barley, and of wheat five modii to an acre; Columella's directions are, four modii of wheat, five or six of barley, three of peas, and six of beans, which I wonder at. So that a modius, as above, being near half a bushel, they sowed above two bushels and a peck on their acre; which is as much as generally we sow in good ground; but then it must be considered, that they sowed in November, and we in September and October.—^f But Palladius says in his calendar of September, In this month, in wet, barren, and cold ground, and in places shaded from the sun, wheat should be sown, in clear serene weather, about the time of the æquinox, that the roots may have time to grow strong before the winter.—^g Speaking of September, he says, This is the first season of sowing vetches to be cut up for food, and the quantity to be sowed is seven modii on an acre.—So that 'tis plain they sowed vetches two months before wheat, and sowed seven modii on an acre; which is above three bushels. But in his calendar of January he says, In this month we sow vetches for seed, and not to be cut up for food;—which seems to agree with what I have in another place observed, that the seed of a plant is the tenderest part of it: and so Columella, lib. 11. f. 9.

sequantur, ne diù jaciens, et non concipiens evanescat. Plin. lib. 18. fol. 300.

Frigidis locis autumnalis satio celerior fiat, verna vero tardior.—Pallad. lib. 1. fo. 60.

^e Novembri mense triticum seremus, et hordeum: jugerum feminis tritici modiiis quinque tenebitur. Pallad.—Tritici quatuor, hordei modios quinque vel sex, pisi modios tres, fabæ sex. Colum. lib. 9. fol. 9.

^f In hoc mense, uliginosis locis, aut exilibus, aut frigidis, aut opacis, circa æquinoctium triticum seretur, dum serenitas constat, ut radices frumenti ante hyemem convalescant. Pallad.

^g Nunc viciæ, cum pabuli causâ, prima satio est; viciæ septem modii jugerum implebunt.

— Of

—^h Of the month of May Palladius says, At this time most corn is in flower, and the farmer must by no means suffer it to be meddled with. Wheat and barley, and all seeds that are single, and do not split, are eight days in flower, and afterwards forty days in growing to maturity; but seeds that are double, such as beans, peas, and the rest of the leguminous kind, are forty days in flower, and are coming to perfection during the same time.

ⁱ Columella, lib. 11. f. 9. has these expressions; It is an old proverbial saying among the farmers, (a) early sowings often deceive us, (a) late never.— We lay it down as a rule therefore, that those places which are naturally (b) cold, should be sowed first, and those that are (b) hot, last.

As to the former expressions, (a. a.) they wholly depend on the clime whereof they are spoken, viz. Italy,---where they used to sow wheat and barley in December: no wonder therefore, if an earlier sowing, where the corn indures the whole winter, oftener miscarries than a later sowing, where it indures but half a winter: nor could they well sow too late, in another respect; because their corn was ripe the beginning of June, that was sowed in December; what harm then can ensue from it's being sown in January or February? for then it will be ripe in July, which is before it can suffer by a cold autumn.—It is plain

Depends
on the cli-
mate, and
is no rule
for us.

^a Nunc omnia prope quæ fata sunt, florent, neque tangi a cultore debent. Florent autem sic: frumentum et hordeum, et quæ sunt seminis singularis octo diebus floreant, et deinde per dies quadraginta grandescunt, usque ad maturitatis eventum; quæ verò duplicis seminis sunt, sicut faba, pisum, cæteraque legumina, quadraginta diebus florent, simulque grandescunt. Pallad.

ⁱ Vetus est agricolarum proverbium, maturam (a) sationem sæpe decipere solere, (a) seram nunquam; — Itaque in totum præcipimus, ut quisque naturâ locus (b) frigidus erit, is primus conferatur, ut quisque calidus, (b) novissimus. Columella, lib. 9. fol. 11.

therefore, it would be very dangerous to import this Italian maxim into England; because we may easily sow too late: for our ground being poorer, if we sow it in May, which is the latter season of English seed-time, it may often be so dry, as never to bring up the corn, and what may be brought up, if the summer be cold, will never ripen kindly; some sort of strong fat lands, and even some cold gravels, may carry it out so late sown.—The latter expressions, (b. b.) are also purely southern, and would deceive an Englishman; but no wonder it was best in Italy to sow their cold land first, whether for wheat or barley; for directions are given by Palladius to sow such wheaten-lands, in September and October;---and those months, and November and December, are drier months than January and February; therefore heavy strong ground may be expected to work better, and the flinging corn into a dry warm bed, especially if land be cold, is of great consequence, whatever weather may come after: and the season of sowing their hot land is as judiciously chosen in January and February, which are wetter.---But this general practice would be destructive to paying rents in England; for the beginning of our barley season being in March, and the beginning of April, and the grounds satiated with winter-rains, 'tis then commonly the wettest season, and consequently cold lands ought not then to be sown, but hot lands; and therefore with us, in that case, the order in husbandry is plainly to be inverted.

The anti-
ents sowed
more corn
on an acre
than we
do.

§. 5. If it be well considered, that a Roman jugerum is but little better than half our acre, and their modius a little less than half our bushel; we shall find that the Romans, see their *Rei rusticæ scriptores*, did seed their grounds more than we do, notwithstanding they sowed better land, and it lay so much warmer than our's.---A modius is 26 lb. 8 ounces.

Pliny

* Pliny orders to sow in an acre, (which is but little above half our acre) of wheat five bushels, (each little better than half our bushel) of barley six modii, of beans a fifth part more than of wheat, of vetches twelve modii, which I think very strange; of chick peas, and chicklings, and peas, three modii, which is equally surprising.

§. 6. Sharrock in his book of Vegetation, speaking of the season of sowing, says, fol. 10. The most natural time of sowing is that which nature itself follows, viz. when the seeds of their own accord fall into the ground. Time of sowing,

§. 7. In the second volume of Collections of travels it is said, that in Muscovy, as well as in Ingerland, Carelia, and the northern parts of Livonia, they do not sow till about three weeks before Midsummer, because the cold, which has penetrated deep into the earth, must have leisure to thaw, notwithstanding which, their harvest is over in August, the sun, which remains so long above their horizon in summer, soon ripening their corn; ¹ but the Livonians are forced to dry their's by the help of ovens in the barns, after it is brought in, which is subject to many inconveniencies, and makes their corn unfit for seed, whereas the Muscovites carry in their's dry and fit to be threshed. fo. 18. Time of sowing in the northern countries.

§. 8. A seeds-man is much less apt to sow too thin going up and down-hill than on a level, because, when he takes his turn up-hill, his steps are always short, and his hand must cast corn at every step; again, going down-hill it is painful to take large steps. — My carter and seeds-man are very positive in this point, and to me it seems reasonable. Of sowing up and down-hill.

* Tritici quinque modios, hordei sex modios, fabæ quintam partem amplius quam tritici, vicæ duodecim modios, — ciceris, & cicerculæ & pisi tres modios. — Plin lib 18. c. 24.

¹ Of this see Mr. Tull's and Mr Duhamel's account in note on Granaries. Article—Of preserving corn.

Of a seeds-
man.

§. 9. If your seeds-man in the cast of his hand back drops pretty much of his seed, which is common to many, who are not right good seeds-men; in the middle of each half of the land, which the seeds-man walks on, you may perceive a thicker list or seam than ordinary, when the corn comes up, as if it had been double sowed, as indeed it has; and the other parts of the ground between must consequently be thinner sowed, by reason of this seed misemployed; old seeds-men will often do this when the wrist of their hand grows weak; but such a seeds-man ought by no means to be suffered to sow.

§. 10. My seeds-man says, he has many a day sowed five, and sometimes six quarters of oats or barley per day; though it is a very hard day's work; but wheat, he says, is too heavy a grain to carry so much of, and that three quarters of wheat per day is very good sowing.

Quantity
of seeds,
and why
farmers
differ in
this in the
hill-coun-
try.

§. 10. In our hill-country of Hampshire some sow two bushels and an half of wheat on an acre, and some sow four bushels: I have been at a loss to understand the reason of this diversity. In both cases, the ground being very poor, I do conclude, that where but two bushels and an half are sowed, the land lies cold, and is also cold in nature, (as at Easton) and must therefore be sowed early, as in August, whereby it has the benefit both of the autumn, and of the spring-tillow. But in warm, tho' poor land, and lying on the open hills, yet much warmer than at Easton, should they sow early, it would run up to spindle; consequently they are obliged to sow late, perhaps the latter end of September, or the beginning of October;----whereby they lose the benefit of the autumn-tillow, and can depend only on the spring-tillow, which on poor land is not considerable; therefore to fill out a crop they sow it thick, viz. four bushels on an acre.

§. 11. When-

§. 11. Whenever you see corn in flourishing proof, and of a good colour, tho' never so thin on the ground, you may be sure the ground is in good heart, and would have born a great crop, had there not been some error in the managing it, either by under-sowing, or by sowing the ground out of order, in respect either to it's temper, or to the season when it was done.

Of sowing
ill or un-
seasonable.

§. 12. Being at Mr. Whistler's, a discourse arose about the quantity of seed to be sown in a new broken up ground, rich in heart.---Mr. Whistler said, he always understood that such ground should be sowed thick.---And it is true; this is the practice: but the intent of this can only be, and the only foundation this practice is built on must be, that the thicker the corn comes up the lesser the ear, and the shorter the straw, and therefore not in such danger of lodging as when sown thin; for then the straw runs to a length, with a long heavy ear; besides, when corn tillows much, as in good ground sowed thin it will do, many stalks or tillows on one root do not stand so firm as the same number of stalks do in the same field, where only one or two stalks stand on the same root.---But this method seems to stint the produce and power of nature, for fear of a worse inconveniency attending the corn by being * more-loose, and so apt to lodge;---whereas, in my opinion, this may be prevented by sowing great wheat, or battel-door-barley, or beans, which have stronger stalks, and are not in such danger of falling as vetches, peas, &c. are;---and thus the increase of the ear will not, as in the former case, be diminished.

Quantity
of seed on
new broke
up ground.

* loose at
root.

§. 13. The only reason, as I conceive, for farmers choosing the smallest and leanest seed for their poor ground, such as ours in the hill-country, is, that the large seed has a posse in it to send forth more tillows than the poor seed, according to which power if the great seed should exert itself, and the ground by reason of it's poverty could not maintain what

Of sowing
small lean
seed in
poor
ground.

what it had brought forth in a green blade, then most of such blades must die, or starve; in which case, it had been much better to have sown small seed, which would have brought fewer tillows, and those have been well maintained.---What way soever, whether by brining or liming your seed-corn, or nicking the seed-season, it is of great consequence, and the first good step to be made, to get good roots from your seed; for, tho' your ground be poor, the larger and fairer the seed strikes it's roots, it has the larger compass of ground to draw nourishment from.

Of sowing
under fur-
row.

§. 14. It seems dangerous to sow any sort of corn under furrow in gravelly land, or such stony ground as may bind after rain, tho' it should work never so fine; for the ground being inclined to bind makes the corn require a much longer time to come up, whereby it runs the greater danger of such weather falling, before it can come up. as may destroy it.

Of sowing
spring-
corn.

§. 15. In the spring-sowing-time. in our hill-country, we may venture to plough and sow our ground a little wetter in the beginning of the seed-season than we may in the middle and latter end of it, because at the beginning of the season the air is cooler than at the latter end, and the sun not so scorching; and so the ground ploughed and sowed a little too wet will have leisure to dry moderately, and not be so subject to bake and bind as towards the latter end of sowing-time, when the season begins to be scorching.

Of sowing
summer-
corn early
on ground
winter-fal-
lowed dry.

§. 16. If ground, be it clay or other cold land, has been ploughed when dry in winter, and so early, that the rains and frosts it has sustained have flatted it to powder; such lands no one should be afraid of sowing to barley, oats, or peas, a fortnight sooner than usual, in case the season be very dry, so that it will harrow on one earth in dust, or stir up in like manner by the plough; for, if the earth be in such temper, no frosts, even the very hardest, following immediately

immediately on such sowing, can freeze the ground, because there is no watery substance in it to be frozen, and the seed, being put into the ground dry, cannot freeze, and so must lie in a warm dry bed.---But again, supposing rain should immediately come, and hold for a fortnight after such sowing, yet the ground so ploughed and sowed, as abovesaid, will lie very light and hollow, for the air, and winds, and sun to dry it apace, and will not lie cold to the corn, as cold clays fallowed and sowed heavy would do, so that your corn will then lie safe: again, when corn is sowed in such ground in dust, a moderate rain will not thoroughly wet it, but the ground, when so dry, will take it without being glutted; and if such rain should continue for many days, time is gained, and the spring, by the end of those days, will be much nearer advanced, which is a great point gained.—But supposing the worst, that after many days rain, when the ground is thoroughly wet, a smart frost should come; neither in this case would corn, sown when the ground was in such order, take harm; for first, it is to be considered, that towards March the sun has got some strength, and that frosty weather is usually clear weather, when the sun shines by day, and thaws as deep as the frost went by night, which frosts at that time of the year seldom go so deep as the seed lies, in ground working in dust when sowed, which falls in deep; but supposing the frost should go as deep as the seed sown, it must still be allowed, the roots of the seeds strike downwards, and first form themselves before the spear peeps out of the rind, or shoots through the skin of the corn; so that to hurt the roots the frost must go deeper than is common at that time of the year; but to prevent all possible evil from frosts by sowing corn so early, when the ground invites you to it by so excellent a temper (which I do not easily foresee can happen) the person
so

so sowing his corn may do well to roll it immediately after sowing, whereby the ground so compressed, if rains should fall, and then hard frosts happen, would be able, by being more compact and close, much better to resist the frosts.

Bad custom among the farmers in their sowing.

§. 17. It is the custom of farmers too frequently both at autumn-seed-time for wheat, and at spring-seed-time for barley, to plough up several acres of each sort a fortnight beforehand, in order to sow and harrow them in immediately, whereby they think, who have a great deal to sow, that they make a mighty dispatch, having prepared so much land beforehand, and kept themselves thereby beforehand in their business, and out of a hurry; but I take this method to be very improper and ill husbandry, for I have always observed such sowings to be full of weeds.---The reason of which I conceive to be, because in August, and at the beginning or in the middle of September, and in the middle of March, when these beforehand-ploughings are performed, the season of the year is warm enough to set seeds on growing, and the earth moldering under the plough is well prepared for that end, whereby the seeds of weeds begin to chissum or set forth their roots, and to germinate in such land so ploughed up before the corn is sowed, the harrowing-in of which when sowed will not prejudice such seeds so as to choak them; no wonder then if you have another crop of weeds along with the crop of the first ploughing, and by harrowing-in the furrows fresh seeds of weeds are moved;---but if any ground may be so managed it seems that for peas may, because in such case, if one plough barley-erish for peas beforehand, we plough it about the latter end of February, which is before the season of the year is so far advanced, as to make the seeds of weeds put forth either root or branch, and therefore, in this case, I have known it often done successfully.

§. 18. Those

§. 18. Those lands that before harvest, on the sun's withdrawing from us, give-out in nourishing and supporting the corn, as, amongst others, cold, loose, hollow, wood-scar land will do, such lands ought to be earlier sown at autumn for wheat or vetches, because in such ground the corn will come but slowly on to establish a root before winter, for the same reason that it gives-out the following autumn before harvest; but such ground ought not therefore to be sowed early in the spring with tender grain, such as white oats, barley, &c. the ground being too cold; such ground also springs later with grass, and against winter grows sooner rowety.

Cold loose
land to be
sowed ear-
ly, for
wheat or
winter-
vetches.

§. 19. There is no article in husbandry of higher regard, and of greater consequence, than the rule of difference and distinction we ought to make between the seasons of sowing light, white, and chalky earth (of which we have abundance in our hill-country) which is generally very poor, and other sorts of earth. By the constant experience of my neighbours husbandry, and my own bought experience, I find, that, if such chalky white ground be sowed very wet, the whole crop is like to be very ordinary, tho' the ground was put into the best heart; for such grounds ploughed wet, to the degree of fatness or dawbiness, will certainly bind, and grow obdurate to a greater degree than the stiffest clays so ploughed; so that little corn will be able to come through, nor shall the corn which grows be able to strike roots freely, by reason of the strong union of the white earth; and successive rains, after you have sowed white earth in such condition, will sooner loosen and open and mollify the parts of clay-earth, so as to let corn through, than of white earth; therefore ploughing such ground wet at seed-time (for fallowing it wet cannot be amiss) or harrowing it wet and dawby, is most pernicious: yet it is a common thing for the farmer, when the rainy seasons make it too wet

at

at seed-time to plough other grounds, to plough and sow in the white lands, being deceived by the mellow breaking of such earth, which seems to fall in pieces, all which soon close into a solid compact substance; nay, the very best of the farmers, who are afraid of, or avoid the former evil, will in such case run into another, when the white earth is too wet to plough and sow at the same time, viz. they'll plough up such lands, and take the opportunity of sowing them when they are dry; but this is bad practice; for the inner parts of these lands bind and squat together below the harrowing tinings, so that the corn cannot strike roots, and if rainy weather continues two or three days after it is thus ploughed, the top of the earth will bind and squat also; so that the harrow tinings will never heal the corn, nor open the ground, tho' they go twenty times over it. The farmer will also, through dispatch, in a hurry of much business, sow his ground in this wet condition, which brings commonly an additional affliction, for, if wet weather follows, his corn must lie above ground, unharrowed, exposed to the birds, and will soon grow, which will oblige him to harrow it in more wet, and unseasonably, than otherwise he would; and these are the consequences of sowing spring-corn in white-land, either over or under furrow.

Of sowing
white earth
that is
grassy.

§. 20. A crop of corn sown on white earth, after it has lain down long to grass, is hazardous, if there come a hot summer after it; a second crop does better; your corn may then with drags and harrows be let in as deep as the plough goes, and, being rolled, will endure the heat and want of rain.

Rule for
sowing
spring-
corn.

§. 20. It is much in the power of farmers to make a short harvest every year, which would be much to their advantage. This might be effected by the order of sowing the different sorts of corn, viz. to sow the rath-ripe and earlier corn so in order,
that

that they might be ripe nearer together, and as early as possible. To do this it is but employing the more hands in a shorter time, whereas there are too many farmers, who, for want of this contrivance, or out of a delight they have in employing but a few hands, so sow their several sorts of corn, as to cut them with the fewest hands in a lingering manner, not considering how much is lost by the thinness of the corn in measure, in a backward harvest, besides the too frequent damage by rains in being late.

Of sowing SUMMER or WINTER-CORN early on one Earth.

§. 22. The reason of sowing summer or winter-corn earlier on one earth is, because the ground being closer and firmer underneath than land often stirred, the corn cannot so easily enter with it's roots, and gain a depth before winter or summer advances.

§. 23. There is a great advantage in sowing early, where it may be done, by ground being in it's nature warm, and lying warm, and being skreen'd from north and easterly winds. It is no small inducement to it also, where it may be done with good husbandry, in consideration that the straw of the corn will be so much the shorter, whereby it is evident the strength of the ground will be so much the less exhausted.

Advantage
of sowing
early.

§. 24. Such land as was hard ploughed, and thereby subject to weeds, or was pot-dung'd, a farmer, of whose judgment I have a very good opinion, said, he chose to sow about Michaelmas, because the sowing such land of the first sort early made it subject to weeds, and if pot-dung was laid early on ground it would be apt to breed weeds. — I ask'd him how the early sowing of land hard ploughed

What land
not to be
sowed early.

ploughed made it subject to weeds. He replied, that much ploughing brought weeds; I suppose cutting the roots into pieces that grow, as it is by colts-foot, which being ploughed-in early gets a-head before the winter comes, but being ploughed late is apt to be killed by the winter.

Of change
of seed.

§. 25. ^m Though white and clay-land may bring corn of very good change for each other to sow, yet in a cold country, where both those sorts of land are cold, and consequently bring a coarse and thick-rinded corn, I do by no means allow of such seed for change, as before hinted. The change of earth to seed is not of that consequence to a crop of corn, as is the flinging in of seed in perfection into a cold ground in a cold clime.

So much depends on the goodness of your seed, that Mr. Hillman of Berkshire, a gentleman of great experience in husbandry, said to me, I verily believe a farmer, that sows clean seed and good change, may live as well upon his farm as the land-lord could do, that had that only farm, and kept it in his own hands, but sowed foul seed, and was careless in his change; for what signifies it to give one shilling in the bushel extraordinary for fine seed-wheat, when three bushels will sow an acre, the produce of which may be supposed to yield twenty bushels that will raise twelve pence per bushel extraordinary; besides, if foul seed be sown, the burden cannot be so large; for a great deal of it will be taken up in weeds.

^m The common opinion, says Mr. Tull, is, that the strong clay-land is best to be sent to for seed-wheat, whatever sort of land it be to be sown on; a white clay is a good change for a red clay, and a red for a white; that from any strong land is better than from a light land, and that sand is an improper change for any. But from whatever land the seed be taken, if it was not changed the preceding year, it may possibly be infected with smut; and then there may be danger, tho' we have it immediately from never so proper a soil.

It

It is however to little purpose to sow the cleanest of seed in the common-field-lands; for it will never come out fine again, because the neighbours in sowing cast over some of their seed into each other's land.

§. 26. Any wound to the nib of any seed, where- Of wounds in seeds, in the smallest fibre is damaged, grows up and increases with the plant, as a wound in the bark of a tree: any imperfections in the leaves of bean-stalks, when they first come up, or other-feed leaves, seem to owe themselves to this cause.

§. 27. Towards the latter end of May (1707) I Defective beans come from defective seed. sowed garden-beans in a piece of strong clay-land in my garden; the ground being in heart, I expected a crop of beans in the beginning of August. The seed-beans were * finnowy, and somewhat damaged * moldy, withinside (for I broke many of them) being laid in a dampish place; the halm or stalk came up well, and they blossomed well enough, but not one kid came of all the blossoms, tho' I sowed a spot of ground two or three lugg-square: the chief end for which I instance this is it's relation to a preceding observation, that defective beans proceeded from defective seed.—And this is the more observable, because in the blossoming-time frequent and great showers of rain fell, and continued so to do till August, so that this failure could not be attributed to any blight, or want of moisture, but to the defect of the seed only.—I also had this spring some summer-goar-vetches, that had been harvested wet, and lain all the winter sodden in their kids, and when threshed they were finnowy and stunk: I doubted whether or not they would grow; I made a trial of them in the garden, but not half of them came up; so I sowed about two acres of them in a treble quantity, but having ten acres to sow, I bought seed for the other eight acres, and I observed, tho' I know the whole ten acres were of equal goodness, that the

VOL. I. L vetches

vetches of the damaged seed did not produce one tenth part of the kids the sound seed did, tho' the halm of each was much of the same goodness.

Mr. Bobart, of the physick-garden at Oxford, gave me some Smyrna cucumber-seeds, of which very few came up, but none of those came up which he reserved for himself: the reason was, as Mr. Bobart suspected, because he kept his too long in the mucilage, after he had taken those out which he gave to me; and I do suspect that mine also, though not kept so long in the mucilage as to perish wholly, had however in the seed of the seed received a perish, because, tho' the fruit came up very fair, being twelve inches long, yet every seed of some hundreds of them wanted a kernel. The like defects I have already observed in beans, whose seed hath been defective, and bore no kids, tho' they blossomed, and others I have had bearing kids and yet not seeds; all which, as well as that of the cucumber, proceeded from the defects of those parts of the plant, which had been formed perfect and compleat in the seed, but had, while in that state, received some damage, so as to occasion a putrefaction in them, more or less, according as they were more or less tender; for, as the plant by glasses is to be seen perfect in the seed, so the respective parts of flower, pods, and seed of the pods, tho' smaller than a mote in the sun, may for as much reason be conceived to be fully formed in the seed: it is plain the kernel of the seed is not so tough or firm a body, as the plant itself, or as the pod, or the skin of the seed, the kernel being at first but a thin gelly or mucilage, and therefore more liable to be damaged. It may be refer'd to the above observation of the Smyrna cucumbers, that, of those exotic plants, which come from warmer climes than ours, though they are of a strong nature, and grow well with us, yet many will not blossom with us, and some that will

will blossom, will not seed ; because, as the blossom is more tender in the seed than the plant, so is the seed of the seed more tender than the blossom. Lucerne grass rarely seeds with us, tho' it flowers, but the jessamine never ; and it is very probable there are such defects in mulberry, grape, and fig-seeds here in England, that from the seeds of the fruit growing in England they can never be propagated in England, though from their seeds they may be propagated in other countries ; this also may seem to account for the degeneracy of the foreign coliflower-seed, when sown in England, from whence, in two or three years time, if sown from seed raised here, no flower will proceed, but only a cabbage-head. Thus apple and pear-trees have been known not to produce kernels, which I suppose was from the damaged seed ; and I do therefore believe the cyons or cuts of such trees will not produce kernels ; of oranges, &c. likewise it is supposed the first failure is in the seed : Mr. Bobart says, oranges rarely seed in England.— Heat and drought, as well as cold, will, I doubt not, hurt the seminal juices of a plant before any other part ; for in the very hot and dry summer, in the year 1705, I found few apples that had any kernels in their seeds, tho' the cotylidones seemed perfect enough, and I question whether under the tropics, or near them, the apples bear seeds, or the husks of the seeds kernels. Seeing therefore that fruit is never the less perfect, tho' it has no seeds, quære whether the stamina farinacea in the flower does not contribute to the well-being of the fruit as well as the seed ; (God having intended the fruit for the use of mankind, as well as the seed for propagation) ; otherwise the blossom that proves seedless ought to fall, as it is observed to do when the stamina farinacea are wanting : for then the whole design of nature is defeated, both in reference to fruit and seed.

Change of
seed.

§. 28. The farmers of Crux-Easton, and this hill-country, buy their seed-wheat from Newbury and that country, because there they are on a white earth, whereas Crux-Easton is on a red earth; and the country about Newbury buy their seed-wheat of us, because to change is thought best.—The changing the seed of all grain whatsoever is of as much use and service as half the dung sufficient for a crop; therefore the farmers are often to blame for not changing so frequently as they ought to do; if their corn prove good and fit for seed they will sow it a second year, and so it may do tolerably well, but longer it will do very ill.

I have a great opinion of the advantage of changing seed every year rather than once in two years; for I sowed barley of the last year's seed in the beginning of April, and I sowed part of the same ground, but a clayier piece of land, with fresh seed of this year's change on the last day of April, which ought to have been the coarser barley, whereas it proved full as white and fine, if not finer than the other.

The order
in which
different
crops
should suc-
ceed one
another.

§. 29. "Pliny takes notice, that the rule laid down by Virgil is, to let the land lie fallow every other year, which, if the farm be of sufficient size to admit it, he thinks is a very good way, but if you are straiten'd in conveniency of this kind, he advises to sow wheat after lupines, vetches or beans, or any other grain that has the quality of fertilizing and enriching the ground.—This is to be well noted, because in England, where our land is worse, the farmer if he pays twelve shillings an acre, will not imagine rent can be paid, unless he sows it every year, and he will not lay it down to grass.

"Virgilius alternis cessare arva suadet, et hoc, si patiantur ruris spatia, utilissimum proculdubio est; quod si neget conditio, far ferendum, unde aut lupinum, aut vicia, aut faba subolata sint, et quæ terram faciant lætiorem. Plin. lib. 18. sect. 10.

§. 30. Some

§. 30. Some farmers approve very much of sowing peas after wheat, and then barley, and say, it will make a better tilth for the barley, and be the lighter, inasmuch as the ground lies down a year with wheat, and but half a year with peas, therefore better to sow barley after peas than after wheat; but it seems to me the best way is (inasmuch as it may suit other circumstances of conveniency) to sow the clay-land to peas, and then to barley, because the clay-land will be the better mellowed thereby for barley, and the whiter and mixt land to wheat, and then to barley, because the whole year such land goes with wheat will not prevent it's working kindly for barley.

Of sowing
peas after
wheat.

§. 31. The country people say, peas do best on a barley-ersh, and of this I have spoken more at large under the article Peas, to which I refer the reader.

Peas do
best on bar-
ley-ersh.

§. 32. Farmer Wingford falling into my company, I told him I proposed to sow my clay-land to peas, and then to barley, and lighter land to wheat and then to barley: he reply'd, I might also very well in my clay-land sow wheat after peas, which I remark, because I think it properly said; for peas will be a manure to wheat on such land, and not make it so light as to be subject to blight, and clayey heavy lands in Wilts are so managed.

To sow
wheat af-
ter peas on
clay-land.

I ask'd farmer Elton, why I should not on the strong clay-land of Crux-Easton sow wheat after peas, seeing strong clay-land could not by being lightened by the peas-stubble be subject to blight, and it was the method of many countries, where their land is of a strong heavy clay, to sow wheat on peas or vetch-stubble; he replied, they had on the clay-peas-stubble sowed wheat the same year at Crux-Easton, and it had sometimes come well, but for the most part ill; for the worm had in October, November, and December fallen on it, and eat it up. I put afterwards the same case to farmer Biggs,

and he said, if the season proved dry for sowing wheat after peas, the wheat generally proved well on clay-land; but, said he, if the peas-stubble be wet when ploughed, the land being hollowed by the peas-stubble will lie very cold, hollow, and wet, the whole year after, and the wheat, if a bad winter, die away. I replied, when I spoke of sowing wheat after peas, I did not mean the sowing it till the year after. He said, he thought there could be no better husbandry than that, and free from the before-mentioned inconveniencies.

I observe, in Wiltshire, where the said husbandry is used of sowing wheat on the same year's peas-stubble, that the ground is of a heavy malmish sort of clay, and consequently not subject to the inconveniency of our hill-country strong clay, which is apt to be hollowed too much after peas-stubble; again, such husbandry is practised often in common-fields, where people will not be at chargeable husbandry; it is also practised (instead of manure) where lands lie at a distance from a farm-house, and in deep baning lands, where the husbandman dares not trust to his fold.

If one would sow a large quantity of wheat on a peas-ersh, it must, in the hill-country, be with a proviso that harvest does not fall out very late; for in that case a large quantity of ground cannot be sowed on a peas-ersh early enough, but a considerable part of it, especially the poorer sort, will be obliged to be sown to barley.

Oats may
succeed
wheat bet-
ter than
barley can
in wet
years.

§. 33. It had been a mighty wet winter and spring, whereby the fallows were well wetted: I had that year a great crop of oats, and but a middling crop of barley, which I impute to the barley's lying wetter, by being buried deeper in the cold earth; whereas the surface of the earth, in which the oats were sowed, was soon and easily rectified, the sun having full power to penetrate that, and to move the

the salts, &c. for which reason, in such wet years, the husbandman should alter his measures, and sow his barley-fallows on one earth to oats.

§. 34. Mr. Byffy of — near Bradford in Wiltshire, ploughed up a piece of French-grass ground worn out, and sowed it on one earth, and said he had excellent barley; and the next year he ploughed it for wheat, which whilst he was doing, farmer Sartain came by, and said, that ground would fool him, for he would have no wheat; —and I having observed a wheat-stubble of his to be very indifferent, asked him, how it came to pass his crop was so ordinary; he said, that was the ground abovementioned, and added, that the corn all blighted; he thought the roots of the French-grass, being not sufficiently rotted, or rather too rotten, but yet not converted into mold, made the wheat * more-loose, which I * loose at believe reasonable, and therefore such ground is to root. be well considered of before so husbanded.

§. 35. Mr. Raymond of Puck-shipton in Wilts, broke up ground of 30 s. per acre to destroy the ant-hills, and the first crop he sowed was white oats; for, said he, if it be sowed with wheat it will be mad, and come to nothing; the second crop he sowed was some sort of great wheat, whose straw is so large and strong, that it is not subject to lodge; whereas, said he, if sown with any of the smaller wheats, such as red straw, &c. the straw of those are weak, and would certainly, being rank, fall down and lodge; the next crop, said he, I will sow red straw; for by that time the ground will be tamed; and this is the approved method in that country, where rich lands are broken up.

§. 36. The whole method of husbandry in the Isle of Wight is, upon the first tilth of land to sow peas; on the next wheat, and then barley. In Hertfordshire the method is to sow, first wheat, next peas, and then lay down to fallow for a wheat-

Sowing wheat too soon after French-grass, condemned.

* loose at root.

What succession of grain on new broken up rich ground.

Order of sowing in the Isle of Wight, Hertfordshire, &c.

en crop, or else sow oats after the wheat, and lay down to grass-seeds.

In Essex,
&c.

In Essex, and some other places, especially where the ground has been improved by chalking, they first sow wheat, then beans, which, being kept clean by the hoe, they reckon equal to a summer-fallowing, then wheat again, sowing broad-clover on their last wheaten crop.

In Wilts.

About Holt, it is a great practice to sow wheat after peas, and then peas, and wheat again, not having in those parts so much land as to afford to let a ground lie still for a summer-fallow. They reckon that a peas-crop does the wheat as much kindness as laying it to a summer-fallow.

In Leice-
stershire.

In Leicestershire they sow a wheaten crop the last, and lay down to grass; the reason they give is, because, the ground having a twelve month to grow to grass, the year following they may expect a very good head of grass; and so gain a year by it; whereas, if they sow it with a summer-crop, they can expect but little show the first year; and Mr. Clark said further, that they counted the wheaten stubble kept the grass warm in winter, and, as it rotted, the worms drew it into the ground, which made much for the grass.

Wheat
sown on
poor land
will not
yield well.

§. 37. I am fully satisfied on experience that whoever keeps land poor, and sows it with wheat, which grain requires land (according to it's nature) in good heart, it will not only produce a thin crop in show, but also a crop that will fall short in respect of yielding.

Not to be
sown on
the green
stubble of
goar-vet-
ches.

§. 38. Whatever the practice may be to the contrary, I hold it improper to sow wheat on the green stubble of goar-vetches cut for horses: this stubble being ploughed in with the wheat will sinnow, and

° See the author's observations on Corn in general, where you will find some particulars relating to sowing.

heat,

heat, and moldy the ground, and be so far from feeding the wheat with a sweet dish that it will make it produce but small ears, and weak tillows, and thin-bodied corn.

§. 39. No wheat can be ensured to be clean seed from oats, if oats be sown in the next adjoining ground, for the rooks and small birds will carry them into the wheat-land. Wheat near oats brings foul feed.

§. 40. I have ventured to sow some grounds with wheat after a wheaten crop the time before, being summer-fallowed the year after for the second crop, and have found by experience that strong land will bear an excellent crop of wheat after wheat, provided it be summer-fallowed the second year, that is, let the ground rest one year, dunging or folding it for the second crop; but by experience I find, that shallow light ground will produce but thin wheat, and a small ear, if sowed to wheat after wheat, and a summer-fallow taken between; though the ground be dunged for such second crop, especially if the spring prove cold and wet; for shallow or weak ground being unkind for a crop of wheat so managed, if the spring and summer prove unfavourable to this grain, such ground will shew its passiveness, and tokens of such inclemency, much more than ground of but equal strength, when sowed to the first crop of wheat. Of sowing wheat after wheat.

Of S O W I N G W H E A T.

§. 41. ^P Lord Bacon, in his Natural history, says, he sowed wheat steeped in urine and dungs of several sorts, chalk, &c.—And that the corn steeped in urine, Of steeping corn. See Wheat, §. 14.

^P In contradiction to this, Mr. Tull asserts, that, if seed-wheat be soaked in urine, it will not grow, or, if only sprinkled with it, it will most of it die.—A very knowing husbandman, whom I consulted on this occasion, confirmed the former part of Mr. Tull's

urine, and sowed in the same earth with the rest, came up, and grew bolder than the rest. — Therefore it seems of consequence that sheep and other cattle have plenty of water. — But he says not that he let it grow till it came to feed.

Of sowing
wheat
under fur-
row.

§. 42. I had wheat sowed under furrow in a ground which I had ploughed, thwarted, and dragged, after which I ploughed and sowed the corn in the most husbandlike manner I could; and indeed the wheat came up in the furrows in uninterrupted parallel lines, and without any weeds between the furrows. — But farmer Ginneway said, that the ground at seed-time working so curious fine should have been sown one cast over the other under furrow, and then the ground between the furrows had been filled, which I believe to be a good way.

By the consideration of a ground where I have wheat sown this year, 1706, where the ground had been winter-fallowed, and brought to a curious mold, I am apt to believe, that in our cold clime, wheat in such earth should be sown under furrow, that it may lie the deeper; for this crop on the 24th of April was miserably thin, and what blades grew seemed something towards an ink-blue, and the roots seemed matted on the surface of the ground; which makes me believe, that the winter-corn was not buried deep enough; being sown, as this ground was, not till the 25th of September, it lay too much exposed to cold; for, where ground works fine, the earth crumbles in at the first tining, and fills up the furrow; and three or four tinings finishes it, in which case it is not possible it should be well buried. — If ground work well, it is also best to sow vetches under furrow, the dung in that case being laid on the ground

Tull's assertion, and assured me he had found it so by experience, but added, if the urine were mixed with somewhat more than one half water, it would make excellent brine for seed-wheat. — See more on this subject in the author's observation on Wheat.

ground after the thwarting it. At sowing, the ground working so fine, the seed was not easily buried, but lay on the surface, which was inconvenient.

Some consideration there ought to be, whether you sow under furrow at two earths or three. It seems, if no reason offers to the contrary, that wheat folded on fallows should be sown under furrow on the second earth, because the strength of the dung is turned down to the corn, but, if folded on the second earth, then, for the same reason, to be sown under furrow on the third earth; but if the winter-fold for barley was on lay-ground, the barley should, for the same reason, be sowed under furrow on the third earth.

September 14th, 1699, I observed a close ploughing up in Leicestershire, and the corn sowing under furrow; the ground had been limed, and so strangely run to weeds, that I wondered at the boldness of the husbandman, and went up to him.---He was sowing his wheat steeped in lime; I observed the grain was plim and very large; I told him in Hampshire we esteem the lesser wheat the best; he said, in the common-fields, where they gave three earths, which laid the land light, they usually sowed of the smaller seed, but (said he) here we choose a large seed, as supposing it has strength to shoot forth it's stalks through the clots and earth it lies under; for it now lies deeper, and the earth closer and heavier upon it than if it were sowed after the plough, and harrowed-in; besides, if very wet weather should fall upon it, so as thoroughly to wet the trumpery of weeds we turn in, a small grain would be sooner chilled than this large sort.---I asked him, how many bushels he sowed; he said, three to an acre.

Mr. Byssy of Wiltshire being at Easton I told him of my new husbandry of sowing my wheat under furrow, and ridging it up.—He said, if I sowed it
under

under furrow so, I must take care to be sure that the ground was so thoroughly moist that the corn might grow from such moisture, though no rain should come; for he had known crops often lost, by sowing dry under furrow,—and I remember my carter had told me the same thing.

In North Wiltshire, when they sow under furrow, I find by the account of many experienced husbandmen, that they aim to sow the last of their crop that way, and to sow it on mellow earth, such as peas-ersh: the reason why they generally sow the last of the wheat so, is, because it is the latter end of autumn, for the most part, before the ground is well wetted, and in order for it; for it is the greatest caution they have not to sow dry under furrow, but, on the contrary, to sow so wet that they may be sure the corn will grow: but I find they all agree, provided the earth be wet enough, the middle of August would not be too soon to sow under furrow.

Time of
sowing
wheat.

§. 43. It seems to me in early harvests, occasioned by hot and dry summers, at which times the wheat is also very yellow, and ripens to perfection, there is no need to sow so early as in cold wet summers, when the harvest is backward, and consequently the wheat more horny; for the ground being heated, or in a manner burn-beaked by the hot and dry summer, and the flour of the wheat dry and mellow, it will come up and shoot away at an incredible rate, and the aftermasses of all grasses in the autumns of such summers carry a strong deep green, a token of the ground being impregnated with the heat, and a proof likewise that it has not been exhausted of its spirits, for they were not transmitted into vegetables, being bound up for want of a vehicle to infuse themselves into their roots by rains; but after cold raw summers the autumn-aftermass of grass has a weak pale verdure.

§. 44. It

§. 44. It was May 12th (anno 1700) and time to consider what to do with the wheaten fallows. Several good farmers were of opinion that it was time enough to sow my fallows a fortnight before Michaelmas, because I had dunged them; but, said they, in case one sows a light and poor ground, or a cold ground, without well maintaining it, such ground ought to be sowed the beginning or middle of August.

§. 45. [¶] To sow summer-corn dry, and wheat ^{To sow} wet, is accounted best for different reasons, viz. in ^{wheat wet.} the spring there is no doubt but rain will come enough to bring up the corn, and in September, when wheat is sown, there is little danger at that time of the year of so much sun as to harden a crust on the earth, so that the corn cannot get out, tho' ploughed and sowed wet. — It may not be amiss however, if one sows wheat at the latter end of the year, suppose at Michaelmas, to sow it when the ground is dry; for that time of the year grows cool, and large dews fall, nor can it be long before rain will come; and, if it be cold land, and sowed at the latter end of the year, when the ground is very wet, it will be the apter to chill.

§. 46. In the beginning of August, 1697, I asked a husbandman when the farmer intended to sow ^{Time of} a certain field to wheat; he said, in the latter end ^{sowing} of August. I asked him how that came to pass, ^{wheat on} seeing he was already sowing the field adjoining with ^{various} wheat. ^{soils.}

¶ It is a general rule, says Mr. Tull, that all sorts of grain and seeds prosper best, sown when the ground is so dry, as to be broken into the most parts by the plough. The reason why wheat is an exception to that rule is, because it must endure the rigours of the winter, which it is the better able to do, by the earth's being pressed or trodden harder or closer to it, as it is when moved wet. For this reason the farmers drive their sheep over very light land, as soon as it is sown with wheat, to tread the surface of it hard, and then the cold of the winter cannot so easily penetrate, to kill the roots of the tender plants.

wheat. He replied, it was because that was such light ground, that it must be sown early, that it might get root before winter came on; otherwise it would be in danger of being killed; but, said he, the former is a clayey heavy ground, into which the winter could not soon penetrate, so as to kill the corn; besides, if that were not sown late, the weeds would get ahead.

On the other hand, December 19th (anno 1700) I saw ground of farmer Farthing's in the Isle of Wight sown to wheat, which was malmed, and it was not come up; also I observed some other persons sowing then; I thought it very late, and asked the farmer about it. He said, that, in their country (the winter being milder than with us at Crux-Easton) if sandy and poorish land be sowed early, it will have spent it's whole strength on the halm, or green wheat, before the spring and summer comes, and will not then be able to maintain the crop.

The sowing of wheat in the Isle of Wight late, that is, at the latter end of October, and all November, especially if land be poor, is very good husbandry, (but it seems it ought to be well trod, lest it should blight by being too loose) because that country is warm through the vapours of the sea, and it would spend itself too fast, in case it was sowed in September; but it is quite otherwise in many parts of Hampshire, because the cold lies so hard there, that the wheat cannot be too rank before winter, and will settle the better; yet, in case the winter should prove so mild, that it should by being sowed early run to be rank, it ought to be refreshed in the spring by pigeon's dung, or some such contrivance; otherwise a small and weak ear with a weak spindle must be expected.

Early-sown wheat does not tillow so much in the spring as late sown.

§. 47. The Hampshire farmers observe, it is not to be expected, that wheat sown so early as the beginning of August should tillow so much, when
spring

spring comes, as wheat would do that is later sown ; because wheat early sown has already tillowed and too far spent itself in the forehand of the year.

I struck in with a notable farmer in company with Mr. Hillman ; it was July 24th, anno 1701 ; I asked them, whether some in their country were not sowing wheat : they said, many talked of beginning ; but, said the farmer, I think they had better let it alone ; for our's is a light and sandy ground, and the summer has been very dry and hot (for not above a shower or two of rain had fallen between May and that time) therefore, said he, these last two days rain (for it had rained plentifully for two days) the corn by virtue of the great heat of the ground will rise up very quick and fast, and run itself out of heart before winter, and dwindle all next summer, for it is in a manner carrying a double crop :—so said Mr. Hillman also.

Of wheat's
tillowing.

Many of the hill-country of Hampshire are of opinion, that a fortnight before Michaelmas and a fortnight after are the prime times for sowing wheat in the hill-country,—but I do think all wheat should be in the ground by Michaelmas day.—It is true, too many of the hill-country do not husband so well as they ought to do ; for poor land sown early, if a mild winter should come, may spend itself so much that at harvest the spindle may be but weak ; but if the land were better husbanded, it would bear the running to rankness in the forehand of the year, tho' the winter should prove mild, and have strength enough not to abate of it's crop in the spring.

It was the 15th of September (anno 1702) when farmer Hawkins told me, that no wheat had then been sown with them about Andover ; for, said he, our ground puts very forward in the spring, and wheat sowed early would then be too proud.

It seems, that in the hill country of Hampshire we ought to take care not to sow strong clay-land

In the hill-
country.

too

too late with wheat ; indeed, the beginning of September seems not to be too early, for there is no danger of clay-land, lying so cold, being too proud, the dews and cold nights in September and October, the frosts and cold rains in winter, and the cold spring will keep it back ; so that it seems in cold clay-land wheat ought to get some good root before the cold seasons come on, that it may be in heart to bear up against the winter ; whereas earth of a mixture between white earth and clay being of a drier, warmer, and healthier nature, and in every of the foregoing respects capable of thriving both in October, and all winter long, how wet soever, as well as in a cold spring, if such land be in good heart, it need not be sowed till the last of all your land.— The mere white earth-chalk might also be sowed as late, but that it is rarely in heart enough.

I was observing to some farmers of Holt in Wilts, it being in the month of March (anno 1702) that their wheat looked much greener than our Hampshire wheat at this time of the year. They said, it was because it was sowed so much later, and that their's would lose it's beauty, and it's first leaf would die and look rusty were they to sow early.

In Leicef-
tershire.

Mr. Clerk of Leicestershire says, if the season be mild, they often sow wheat at Christmasts, and that Mr. Chestlin has sowed wheat this year (1699) which is not out of the ground, it being the 12th of February ; that if they should sow wheat as early as we do in Hampshire it would be destroyed by weeds, as well as be too rank.

Wilts.

Mr. Raymond of Puck-shipton, Wilts, tells me, the notable men, who make their observations in the vale, say, though they should not have a season to sow their wheat so early as they would, by reason of the wet, and are forced to sow late, suppose the middle or latter end of November, yet they find such wheat will do very well, if very hard frosts do

not

not come before it has made a pretty good spear under-ground; no matter whether it has first put forth a blade or not, for by the time the spear is shot under-ground the corn is well rooted.

I have eight or nine acres of brashy ground, tho' redish and clayey, occasioned chiefly by the abundance of stones, which mixing with the clay make it hollow; this ground was fallowed up pretty late in the summer, viz. the latter end of July or beginning of August, with intention of ploughing it again, and sowing it with wheat; but viewing it September the 30th, after a good shower of rain, I found it would work and tear very well on one earth so as to harrow off at six tinings at most: so, tho' the ground was designed for two earths, yet I sowed it on one earth; for it is of that consequence to get in corn in good season, if the ground will work well, that in the hill-country, where we have a great crop of wheat to sow, no opportunity of sowing may be lost after this time of the year; for it very rarely happens but wheat early sown in such ground as above described, and in the hill-country, comes off better, and produces a better crop than the last sown wheat, tho' we were sure of a season for sowing it.

I observed, that a few lands of the abovementioned ground had a pretty deal of grass come up in them, and said to the man, who was there sowing, that I thought such grass would tear up pretty well with the harrows, the ground being hollow, and having lain down but one year.—He said, that he thought also the grass would do no harm, because the ground would be sown early, and so the wheat would out-grow the grass, and top upon it,—which I thought a good reason.

§. 48. * The old custom in the hill-country in Hampshire has been to sow two bushels and an half

* Mr. Tull observes, when wheat is planted early, less seed is required than when late: because less of it will die in the winter than of that planted late, and it has more time to tillow.

In ground
run to
grass.

The earlier
wheat is
sowed the
less seed is
required.

of wheat on an acre in the ground early sown, but in that later sown three bushels and an half on an acre.—The reason they assign is, that the earlier the wheat is sown the more it will shoot out in blades and tillows, and spread farther, whereas the later sown corn will not spread, the cold winter coming on it, and very likely give but one blade only.

One Parker came to see me with farmer Biggs; he was speaking of the great fatness of their land for wheat, and said, that at the latter end of November they sowed but one bushel on an acre, and, if in January, but a peck more; therefore, said he, tho' we give fourteen shillings per acre, we sow a bushel less on an acre, nay a bushel and three pecks less than you when we sow late, for then, said he, you commonly sow three bushels; so that the bushel of seed you exceed in, or a bushel and three pecks, will abundantly recompence for what we exceed in rent, especially when wheat is at six shillings per bushel; but then, said he, we give three earths.

I was telling Mr. Bachelour of Ashmonsworth, that I found I had underseeded my wheaten crop that I had sowed in my clay-lands in September and October this year (1705), and yet I sowed three bushels on an acre.——To which he replied, that of late years he and others had by experience found, that at that time of the year it was best to sow at least three bushels and an half; nay, said he, the ground at that time will take four bushels, and we find 'tis best to sow four bushels and an half of barley, and five of oats on an acre.

As most farmers, who sow any quantity of wheat propose to buy every year a load at least of seed-wheat for change, so it is adviseable to sow the said load of bought seed so early, and in such forward ground, that they may be likely to house and thresh it time enough for sowing the next year's crop, which, in the hill-country, is by the middle of August.

One

One ought to contrive to have the clean feed-wheat for a change as early as may be, because it is much dearer than common wheat, and the earlier it is sown it will go the farther, because less need be sown on an acre; again, it is proper to contrive to sow the choice clean wheat in good land, because the increase will be the greater, whereby you may have the more to serve your own occasions, or to pleasure your neighbour.

§. 49. It seems to me cheaper and better to buy middling clean wheat for feed, and hand-pick it, than to buy clean seed, because it costs less to hand-pick that wheat than what one must give over and above for clean seed, which is never that I know of clean, though pretended so to be.

Of hand-picking-feed-wheat

§. 50. It is a common expression in country-men's mouths, that old wheat is not so subject to blight as new,—but, as I take it, the blight is not founded either on the newness or oldness of the corn, but inasmuch as old wheat is generally sowed betimes, and before new wheat can be had, therefore such land is less subject to blight is true.

Sowing early prevents blighting.

Again I judge, that, whereas it is said, that wheat sowed early is less apt to blight, the ground having more time to settle, the main reason is, not that the time that latter sown ground hath to settle is not long enough before the burning weather and blights come; but that, when ground is sowed early, it has time to settle before the frosts come, which keep heaving and hollowing it, and hinder it all the year after from settling.

§. 51. It is observed, that new wheat and old wheat being sowed at the same time, the new wheat will at the end of the first three months be above a week forwarder than the old: for this reason I advise to sow old wheat at the first and earliest sowing,

Different times of sowing—new and old wheat.

Of plough-
ing in brit-
ted wheat
for a bas-
tard-crop.

* brit shed.

if you fear winter-pride, but new wheat, if you sow late, and fear it will be backward in tillowing¹.

§. 52. In a hot summer, when harvest comes early, before the strength of the summer be far spent, when the wheat is yellow, tho' not hardened and thoroughly ripe, it is incredible how soon, if the ground be wet, * britted corn will grow. I had some acres this summer (1714) blown out by a high wind, enough to seed the ground for a bastard-crop; and what fell in crivesses and chinks, the wind coming with rain, grew to be five or six inches long in ten days time; so that in such cases, if you think to drag or plough it in, the sooner the better; and, if you plough it in, the shallower the better, and the furrows as narrow as may be; that, if it cannot get through the furrows, it may have the less way to shoot slantwise before it meets a seam to come out at.---The less grassy any ground is, and the more knot-fine, so much the narrower will the furrow turn up, or break by the plough.

OF S O W I N G B A R L E Y.

§. 53. "Sow barley in the drier lands, says Varro; so that, in those hot countries, they did not look on their land too hot for barley.

Time of
sowing
barley—
should be
early sow-
ed.

§. 54. It was Christmas (anno 1702) and farmer Biggs, farmer Crapp, Mr. Bachelour, and farmer Hascall were with me: I proposed to them the advantage of sowing barley and summer-corn earlier than they did by a week or a fortnight, in case the land was in any good heart, and in dust, for the damage by what might die by bad weather would not come to so much as was always lost by drought.

— Farmer Biggs and farmer Crapp were of my

¹ See the author's observations on Wheat.

² In aridiore hordeum potius quam far serito. Varro, fol. 43.

opinion,

opinion, but Mr. Bachelour differed from us, which seemed to arise from his sowing poor land early, but I grounded the supposition on the land being in good heart; however we all agreed, that the earlier barley was sowed the finer it was, and the later the coarser, which must arise from the first having it's growth from it's earing in a hotter time, whereas that sowed later has much the colder time; so rather ripe barley is generally the finest. Farmer Biggs said at another time, that a week's sowing earlier than ordinary was of great avail to the fineness of the barley.

Considering therefore the small dispatch in ploughing the second earth in the spring, and the danger of being late, and also caught in the wet, it seems to me most reasonable to hire ploughs to help, the first dry season that offers, and not to trust to the contingency of dry weather; for, tho' you should continue hiring the whole barley seed-time, yet you will be well repaid for it by putting your corn in early, which will carry the finer and larger body.

Captain Tate of Leicestershire says, that it is allowed that their early sowed wheat and earlier sowed barley are the best, and that, if the season permits, they begin to sow barley the beginning of March;—to that therefore I must attribute the fineness of the barley of the north, seeing they lie wetter than we do at Easton, and seeing that we at Easton have finer barley than at Burclear, &c.—where they are on the clays, they sowing as late as we do; yet there should be some difference in soils, seeing Captain Tate named a place in Yorkshire, where he said was the finest barley in England, which would be ripe and in the barn in eight weeks time.

§. 55. At seed-time, in flinging the barley into the ground, the farmers are much governed by the season of the year; for, unless the ground be very dry, and has had warmth by some good weather

Time of sowing barley on different kinds of land.

preceding, they hold it not proper to sow their barley, in fallowed land that they stir again, till about a week in April, because, if much wet should fall on such land after sowing it would lie sodding, and be apt to chill the corn, but on white land which they sow on one earth, if the weather be dry, they often sow a week before Lady-day; for from such land the water runs off and sinks down the better; besides land so sown is usually white land that is naturally dry and warm.

Mr. Worlidge in his *Kalendarium Rusticum*, fo. 270, says, About the end of March or earlier you may begin to sow barley in clay-land, but not so early in sandy-land.—The only reason of which, as I apprehend, is, that hot weather coming on apace at that time of the year, the clay-land is very subject to bake; therefore it is best to sow barley there before the sun has such power, whereas the light land is in no such danger; and since, as above, you find that barley to prove the finest that is sowed earliest, so, as clay-land naturally brings the coarser corn, sowing it the earlier may much mend it.

Why
weeds
abound in
early-sown
barley.

§. 56. It is observed by many, that, when they have sown their barley very early, the crop has been almost eaten up by weeds; the only reason to be given for weeds in early-sown barley more than in that sown later is, because many weeds and their seeds are of a more hardy nature than barley, and will grow early, whilst the spring is as yet cold, and may get the forehand of the barley, and over-top it.

Time of
sowing
barley in
Leicester-
shire.

§. 57. February 1st, (anno 1699) I observed a close of about twenty acres belonging to a farmer of Hawthorne in Leicestershire, which had been fallowed up but the week before, was sowing to barley; thinking it was very early I asked the farmer, who was in the field, whether it was common in that country to sow so soon. He answered, that they generally found the barley first sowed proved best,
and

and so said others whom I spoke to about it.---This ground kirkelled very fine, and was of a curious fat light mold, lying very warm amidst the barns and houses of the town, and upon a shoot, that neither rain nor snow could lie long on it.---I spoke to Mr. Clerk of it, and he said, by the middle of February all the common-fields and inclosures would be sowing with barley: this was as warm a winter as had been known.---He said their grounds were very apt to bind by heat, and therefore the barley was better if it was pretty high; whereby it kept the ground cool against the time the hot weather came upon it.---He said, the snow at this time of the year never laid long with them, but he approved of late sowing where the snow lay long.---He added however, that the farmer abovementioned sowed his barley a fortnight the earlier in hopes it might be reaped the sooner, and so he might be the forwarder in his turnip-feed-time.

§. 58. My opinion is, that such grounds as are What kinds of barley to be sown on different soils. early-sown in a cold hill-country, the land itself being also cold or clayish, ought to be sown with a late-ripe barley, especially if such land be declivous from the sun, or hidden from it by hedge-rows; for the straw of rath-ripe barley being in it's own nature weak, will be much more so where it has not it's share of the sun, and where the cold clay-ground gives off it's strength sooner, after the sun's passing the solstice, than other ground; on this account the straw of the rath-ripe barley, for want of being supported and nourished to it's maturity, rather withers than ripens, and then the straw must needs crumble or fall down; and the grain will plim no farther, but dry away and be very thin; but the straw of late-ripe barley, being bolder and stronger, will stand the longer; and, tho' the sun should be withdrawn, and the corn should lie under a shade, yet, so long as it stands upright, the straw will convey so

much nourishment to the grain, it being sown early, as to ripen it kindly: even notwithstanding the disadvantage of being shaded from the sun. — Yet, if I may advise in this case, I should rather propose in such ground as lies from the sun, or is shaded, especially if it be clayey and cold in it's nature, to sow white oats; for they will have finished their course sooner, if sown pretty early, and will ripen before the strength of the sun shall be much declined. — If to avoid the aforesaid mischiefs late-ripe barley be not sown, and there should come a cold wet summer to add to the evils aforesaid, rath-ripe barley being sown will fall much the sooner, even while the straw is green, and will then never come to maturity, but from the roots new tillows will shoot forth with green ears, which will neither ripen themselves, nor, by drawing away the nourishment, suffer the first and elder ears to ripen. — The reader may see more relating to this subject in my observations on Barley, where I have treated more largely of the nature and qualities of this grain.

Quantity
of barley
on an acre.
---Hants.

Leicester-
shire.

§. 59. Four bushels of barley is generally the quantity allotted to be sown on one acre, but, if the ground is very good, they may sow five bushels.

Mr. Edwards of Leicestershire sowed this year (1699) four bushels of barley on an acre, because his barley was not good; when his seed was good he used to sow but three bushels and a peck at most; upon which he argued much to prove, that it was most profitable to sow the best seed, for what of the other will grow, said he, nobody knows.

If the fallows are
dry, barley
and oats
may be
sowed earlier.

§. 60. If the fallows are very dry, barley and oats may be sown somewhat the earlier; for it is a great matter to throw seed into a dry bed, especially if cold and wet should come after. Summer-corn may be killed two ways by cold, 1st, by the chill and coldness of the earth; 2dly, by the fierce season and coldness of the air:—Now, if corn be sowed when

when the land falls into powder, tho' cold rains should fall after, yet the land will lie so warm as not to chill the corn; and if the root is not starved, tho' the blade should be taken off, that will grow again; but if ground be ploughed wet, and such weather should come, the corn will be in danger of being killed both ways.

§. 61. The general proverbs or wise sayings of our ancestors relating to husbandry, seem rather to have been calculated for the vales than the hills; for the hill-country was of less consequence till the late improvement by sowing grass-seeds. The ancients used to say, "barley should leap on the ground, when sowed out of the hopper,"---which exactly suits the condition of the vales, where commonly they begin to sow their barley at the latter end of February or the beginning of March, when it is impossible such deep lands should at that season be too dry; they are rather subject to the other extreme; but in the hill-country, where the lands are light and poor, I have often experienced, that we have sown in the spring, when the ground has been so dry that there was no likelihood, except rain came, of seeing half the corn come up, and we have often waited a month for rain; the consequence of which has been thin barley, and an edge-grown crop; therefore, if my ground be rightly prepared by seasonable fallowing, so as to work fine at seed-time, I never fear sowing my barley too wet, provided the ground be not in danger of treading*.

Different seasons of sowing barley in the hill and vale-country, in regard to wet and dry.

Of SOWING BARLEY and OATS.

§. 62. How much cold is an enemy to vegetation may appear from the seeds being put into a glass

* Of barley's degenerating, and cautions to choose the fullest and best bodied seed, see our author's remarks on Barley.

* put forth
roots.

glass of water; for many days they will not * chisum, nor imbibethe water; but their pores will rather be closed than opened by the water, it being cold; for which reason I conceive it not to be good to sow the lanten corn in cold clay-lands, especially barley, early;---for it seems not to be good to check seeds in their progress to vegetation, for not proceeding in that case is going backward, and such damage may the seed receive in a few days, when first sown, as it can never after recover.

§. 63. I cannot find in the four ancient authors *De re rusticâ*, that any of them give any directions about sowing oats: it seems they had an opinion, that they were a grain to be neglected, being, as Virgil has it, of a burning quality, and exhausting the land, and they having other variety of corn for their cattle.---On review I find the following brief directions in Columella. * Oats are sowed in autumn, and partly cut up green for food, and partly reserved for the sake of the seed. The seed here to be laid up seems intended for seed again; for I cannot find any directed for feeding horses, &c. in these authors. If these oats were to be cut green, no wonder they preferred other sorts of leguminous corn.

Time of
sowing
oats.

§. 64. I inquired of a farmer in my neighbourhood about seed-oats: and whether he had any to sell: he asked me, if I thought it not too early to sow them yet, it being March 27, (anno 1703) for, said he, I once sowed oats at this time of the year, and in good land that I had designed for barley; but cold dripping weather came, and I had not two bushels again in an acre.

Time of
sowing
white oats.

§. 65. A field of mine having born three crops, the last of which was vetches, I sowed the fourth

* *Avena*, autumnò sata, partim cæditur in fœnum, vel pabulum, dum adhuc viret, partim semini custoditur. Columella, lib. 2. c. 11.

with

with white Poland-oats: the ground ploughing very fine, and harrowing in dust, I was the rather inclined to harrow them in on one earth, since I could lay them in a warm dry bed, the ground being very dry, which induced me to do it so early as the 9th and 10th of March, though it was sooner than I had ever known them to be sown.— There followed a very dry cold spring (anno 1713) without rain till the first of May, when there fell a plentiful rain, which went to the roots of all corn; one fourth part of the oats sown never came up, and those that did, looked spiry and weak till about the 20th of May, and then, warm weather coming, they thrived wonderfully in tillows, rankness, colour, and breadth of blade, so that it was plain the ground was in sufficient heart; but they were sown too early: it further appears that they were only sown too early, because the upper part of the ground, though by much the best, had not half the crop of oats the lower part of it had; the reason of which was that the upper part lay most exposed to the cold.—From hence it is plain, that two or three days before the end of March, or after the beginning of April, is the time for sowing white oats, and, if the ground be ploughed just before sowed, they will lie the deeper and warmer.

§. 66. Five bushels of oats is the quantity they sow in the hill-country on an acre;— but, if there be a strong elbow-wind at the time of sowing, there must be half a bushel extraordinary allowed to an acre, whether oats, barley, or wheat, but a face or back-wind signifies little, nor the elbow-wind neither to peas or vetches.— There are some farmers among us who sow but four bushels, but that quantity is not sufficient to feed an acre properly: though the feed be very good they ought not to sow less than four bushels and an half.

§. 67. Hugh

Quantity
of wheat
barley and
oats sowed
on an acre
in Leicest-
ershire.

§. 67. Hugh Clerk of Hawthorne in Leicestershire, and Mr. Clerk of Ditchly assure me, that, on light lands in the common-fields, they sow six bushels of barley in a lugg, that is a chain-acre, though but four in clay-land in the same fields.—I asked Hugh Clerk the reason of it; he said, because, if the light land was not filled with corn, it would be full of weeds. I asked him whether the clay-land would not be the same, and if so, why he did not sow as much on that; he said, the clay-land would have as full a crop with four bushels as the other with six, for from one grain the clay would put forth three, four, and five stalks, whereas the light earth would not yield above one or two stalks.—I saw this sort of clay-land last abovementioned, and I thought it was half clay half sand. — On the lighter land they sow three bushels of wheat, on the heavier but two, and of oats not above four bushels on the light land, for, said he, there is more of that grain goes to a bushel.

White oats
to be sown
thick.

§. 68. At Whitchurch farmer Perry and Mr. Bunny had discourse with me about the nature of white oats: —they both on their own experience agreed that they were to be sown very thick, because they would not tillow nor multiply like black oats; —therefore, said they, five bushels ought to be sowed on an acre.—Farmer Crapp agreed afterwards that they would not tillow like black oats; but others I find are of a contrary opinion, as I have noted in my remarks on Oats. * Mr. Ray says the white oat will degenerate in poor ground, and become a black oat. — See my observations on Oats.

Vid. Oats.
Of the til-
lowing of
white oats.

* Si ager paulo sterilior sit avena nostra alba in nigrum degenerat. Ray, fol. 42.

OF S O W I N G B E A N S.

§. 69. ^b Palladius tells us, it is a rule laid down by the Greek writers, that all corn of the leguminous kind should be sowed dry, except beans, and they ought to be sowed wet.

§. 70. In Wiltshire they sow beans in December and before Christmäss. — Farmer Miles said, it was observed that those beans kidded best, and he thought the reason to be, because such beans, being checked in their stalk by the cold weather, did not spend their strength, when at the same time their roots were getting a fastening in the ground, whereby they so much the better fed their stalks when spring came; whereas the beans sown late, having no check, run into halm, and draw faster from the root than it can afford, and so the root has the less strength for kidding.

Time of
sowing
beans in
Wilts.

§. 71. August 30th (anno 1721) I shewed farmer Sartain of Broughton in Wilts the two acres and half of beans I had sowed; the strongest and best part of the ground bore the worst beans, and the lighter land by much bore beans excellently kidded. — I had been at a loss for the reason of it, but as soon as the farmer entered that part, which was the strong and cold land, he said, those beans looked as if they were sown too wet. — On reflection I well remembered, that I feared, when they were sown, that part of the ground was too wet. Why, farmer, said I, should beans be sowed as dry as peas? he said yes, if ground be strong-clay-ground, one need not fear sowing them too dry in February or the beginning of March, for so early

Beans, if
sowed ear-
ly on strong
clay-land,
to be sowed
dry.

^b Omnia legumina Græcis auctoribus seri jubentur in sicca terra, faba tantummodo in humida debet spargi. Pallad. lib. i. sect. 6.

in the spring the ground could not but be moist enough to bring up the beans.

How to
plant horse-
beans in
stony-
ground.

§. 72. I was asking farmer White of Catmoor in Berkshire, how he would advise me to sow horse-beans, whether to plant them or sow them; he said, he thought in our country we could not well plant them, because, our land being very stony, the stick for the most part would not enter the ground, and it would also be very difficult to hough them; — but Major Liver did not apprehend these to be objections, and said, if I planted them, I must plant by a line across the furrows, because there is no good houghing with the furrow, the earth not being well raised about them.—About Catmoor they often sow beans and peas together.

Of the
feminal
leaves of
seeds.

§. 73. Mr. Ray supposes, that the feminal leaves first swelling do afford the first nourishment to the nib or radicle to shoot, which having gotten root does again nourish the seed-leaves, which do again communicate their oleous and salt particles to the plant; but, says he, in seeds, whose leaves or feminal lobes do not rise above ground, as in beans, peas, vetches, and other legumens, the radicle, as far as I have observed, does afford no nourishment to the lobes, which therefore cannot properly be said to increase and augment, tho' they swell very much, occasioned by the watery humour that insinuates itself into their pores, as into a sponge. Ray's Proleg. fol. 28. For this reason the feminal leaves or lobes of these grains may not be much the worse for sowing tho' the lobes are partly cut off. The root of every plant makes a beginning, and shoots downward before the plume stirs and advances upwards; for the plume is included between the lobes of the seed, and so the moisture or vegetable parts of the earth cannot come immediately to it, and lend their assistance, as they can to the outward part of the nib, which

The root
shoots first.

which sends forth the root, and therefore the root must make it's first advance.

OF SOWING PEAS.

§. 74. Many good farmers I have conversed ^{Of sowing} with on the subject of sowing peas, agreed, if the ^{peas under} ground was very dry, and worked pretty fine, it was ^{furrow.} best to sow peas under furrow;—but, if they were sowed under furrow when the ground was wet, and a dry season should come, the ground would be so starchy that they could not come up.—By sowing under furrow there is this certain advantage, that the peas are secured from pigeons.

Feb. 12th, (anno 1699) they were sowing peas ^{In Leices-} under furrow in the common-fields in Leicesteshire, ^{tershire.} and also harrowing some in.—I asked Mr. Clerk what rule he went by for harrowing-in peas, or sowing them under furrow; he said, if the land was light, they sowed under furrow; but if heavy, they ploughed and harrowed-in; or though the land was clay and heavy, yet, if it had had a frosty winter, whereby it broke and crumbled well under the plough, they sowed under furrow, or sometimes, though land in it's own nature light, having had an open wet winter, should work heavy, they have nevertheless sowed peas under furrow.

The great danger of sowing peas under furrow, the ground being wet, is, if rain should come upon it, and after that a baking sun, the earth will have a glazy crust at top; now a pea will shoot forth a stem or wire, which shall work upwards, tho' a foot under ground, but the danger is lest the bud, or leafy substance it shoots out when near the top, being broad and tender, should not be able to get through the said crust, and so be buried.

§ See the article Beans.

Farmer Lake of Faccomb, a very understanding husbandman, is not fond of sowing peas under furrow ; he says, they are so long in coming up that the knap-weed, and other weeds get up before them, and are apt to smother the peas, and if the land lies on a slope, it is hard to plough shallow enough, and so the peas may be buried.

Farmer Carter of Cole-Henly being with me, we were talking of peas ; he said, he had always observed, when peas are sowed under furrow, if the furrow ploughed heavy and close, so that the peas could not shoot upright, but were forced to shoot asslant for a good length before they could get out, that, tho' such peas halmed well, yet they never blossomed nor kidded well. ---This is very probable, and agrees with what has been already set forth, viz. That where a plant receives any injury, the first is in it's seed, as being the most tender part, the next is in it's blossom, &c. Note, It is very obvious, that, where the pea runs slanting under a furrow before it can get out, it must spend itself, and it is also visible, that it loses of it's health thereby in it's being whitened and blanchd.

In Wilts.

The wet spewy clay about Holt in Wilts, of which sort that country does much consist, if kept in arable, is mad by much rain, if heat or winds follow ; for which reason the countryman is forced to sow his peas under furrow, and to leave the ground and furrows rough upon them, without harrowing in the grain, in hopes that, if rain come, the ridges will molder and tumble down, and then grow mellow, that so happily the peas, if the ground breaks kindly, may come through the earth under which they are covered, and, if the earth be too close, that they may notwithstanding come through the seams of the furrows ; thus their lands when finished lie like summer-fallows for wheat, for the finer they make their grounds the faster they bind, if rain
 I should

should come and dry weather follow, so that no peas could come through; whereas in the rough manner (above described) in which it lies, the heat and rains together contribute towards the moldering of the earth; though this way is subject to many inconveniencies, (as before set forth) yet under the circumstances abovementioned I know not how the countryman can do better; but where such lands do abound, those parts of England will never get the name of corn-countries.

Farmer Reynolds, of Laverstock in Hampshire, speaking of sowing peas early under furrow said, — it was an old proverbial speech, that

“ The longer peas lie in their bed

“ They will rise with the better head.

Which observation I have found to be true.

§. 75. February the 3d and 4th (anno 1713) I ^{Of sowing} sowed four acres with Cotshill-peas under furrow. ^{peas early}

—February 5th to 10th I sowed under furrow ten ^{under fur-} ^{row.} acres with great grey partridge-peas; 'tis true, we

had no stinging sharp frosts to endanger them that way, but we had a very long cold dry spring with easterly winds, yet I could not observe that either of these peas suffered by being sowed so early, but flourished much the better for it.

¶ Iles, my tenant in Wilts, and Smith of Dead. ^{In Wilts.} house, had sown the same grey partridge-peas under furrow the 25th of January in mellow good ground, and throughout the spring I observed the halm to flourish very well, but at harvest, there having been an exceeding dry spring and summer, they, like the generality of the peas of that country, bore very short and but few kids, whereas I had long ones, and my halm-extraordinary well kidded, not only of this sort, but all the sorts of peas I sowed, viz. blue peas and poplings, early in their season, which I attribute to the summer-fallowing my ground.

To plough
up the
ground in
the hill-
country
some time
before you
sow rath-
ripe peas.

§. 76. I am clearly of opinion, that in a cold hilly country, and more especially if the soil be clay, which is therefore the colder, if you sow any of the rath-ripe peas, which are the tender sort, such as poplings, blue-peas, or Henley-greys, it is prudent to plough up the ground a fortnight or three weeks before it be sown, that it may be dried and mellowed by the air, wind, and sun, and then to take an opportunity of sowing the peas when the ground is in the temper above described, which cannot in such a situation be too nicely regarded; for the common way of sowing after the plough the latter end of February, or beginning of March, especially if the grain be tender, is still the more improper, because the earth will at that time turn up a little moist and cold, which so early in the year chills corn; whereas by turning up the ground a fortnight or even a month before you sow it (according as your ground may require time for mellowing) you'll be able to command a fit time to sow your seed in, a few dry days rendering land chastened, dry, and friable; nor will land ploughed up dry in a cold country so early as January or February be apt to bring weeds by lying fallow.—I would also recommend the same way for oats or barley, if sowed by the middle of March, before the weather is warm enough to set the seeds of weeds a growing by the earth's lying in such a manner tilled.—But when I recommend the ploughing up of land a fortnight or even a month before it is sown, it is not meant of strong land; which will not by such time be brought to harrow, nor of light ground, which works knot-fine; for, if rain in the interim should come, such ground will quatt, and the furrow will fill up, and lie foggy and wet long after; but such ploughing beforehand is meant of ground, which for the most part will hold a furrow, or plough with some roughness, yet so mellow as to shatter either by dry or rainy weather.

§. 77. Being

§. 77. Being in Wiltshire I inquired of the farmers, viz. farmer Earle, Mr. Smith, &c. why they did not sow popling or grey Burbage-peas: I found they thought those peas too nice to sow in their cold lands, and said they did not do well with them, but that the hot and sandy lands about Scene and the Devises might be very proper for them. — Note, It is my opinion, when any pea is sowed early under furrow, if the land be somewhat mellow and friable, as in that case it ought to be, and also to be very dry when the peas are sowed, the best way is, after the peas are sowed, to let the furrows lie unharrowed for some time, it may be for three weeks or a month, for the roughness of the ground will be a great means to keep the peas warm from frosts and winds, and dry from rain, whereas, if such land be harrowed off fine, immediately after the peas are sowed, it will lie wet and cold a long time in January or February before it can dry again, that being the wet season of the year, and no sun to dry it; but if such land be harrowed only two or three times a month after sowing the peas, they lying deep will only have rooted, but not sprouted, nor will any of them be torn up by the harrows; this method will protect the peas from cold till the fierceness of the season is over, and secure them a warm bed at first putting in by the furrows covering them and shooting off the rain, which is of vast consequence to all sorts of corn.

Difference
of peas in
hardiness,

Best to let
the land lie
unharrowed
some after
sowing
peas,

§. 78. A neighbour of mine sowed peas on fallows, being dry and in good order, but, before he could finish the harrowing them, came a snow; after the snow was melted, which was in a day or two, he sowed more in the same ground, being of the same goodness, and harrowed them in, the ground working pretty well, but not so well and mellow as the former: of the peas of the first sowing he had treble the crop he had of the latter sowing. — I conceive, for the solving these two notable instances, we may compare corn to an egg, which has the fan-

Peas chilled
by
being sowed
after
snow,

Of the
punctum
faliens in
seed.

guinea gutta, of which Pliny says, "certò saltat pal-
" pitatque," and the many damages that sanguinea
gutta receives on the first incubation, either by
thunder or shaking, or chill the egg takes, are
reckoned up by the Roman writers. Now, in like
manner, in the germen of corn there is a punctum
faliens, a minute vital principle, which moves, and
which receives an immediate check, if laid in a cold
bed, which has a notable ill effect throughout it's
whole progress of vegetation afterwards; and a
warm dry bed, which enlivens it, has, on the con-
trary, a good effect. I think there is no room to
doubt but that there is an innate action in seed,
more than is merely mechanical, implanted in it by
God Almighty, (it is this, which in it's punctum fa-
liens, inclines the root to take downwards, and the
stalk upwards; otherwise the first conduct in vege-
tation is unaccountable) and that the seed has this
power of action seated in itself purely relative to the
thing it performs, and confined only to that; nor
is this strange, seeing the union of the soul and body
in man cannot be resolved without flying to Omni-
potence; it is the same of the animal life with the
body of brutes, and it is plain the things of this crea-
tion move within peculiar spheres of subordinate
gradations; we may therefore well believe there is a
power of action thus confined, which partakes not
of any agitations; this may be termed a moving
spring, elater, or pulse; nor is it rash to affirm such
a motion we cannot see; for who can see the motion
of the index of a clock? and yet, that a motion can
be a thousand millions of times less, none can deny.

Of drilling
peas on
light
ground.

§. 79. On lightish or whitish ground, or such
ground as one may suspect to be too light for peas,
in my opinion they ought to be drilled when sowed,
and drilled at a tolerable distance, that a sufficient
quantity of earth may be houghed up to cover the
roots of the peas, in order to keep them moist, and
to break the scorching heat of the sun, which
bring

brings blights, choaks them up in blossoming-time, and occasions other evils, which may be the chief reason of drilling about Burbage.

§. 80. I asked several knowing farmers when was the best season to sow peas. In this country, said they, peas as well as vetches require to be sown early and when the ground is dry; if they are sowed when the ground is very wet, or if much wet falls upon their being sown, they will be apt to burst, and swell out of the ground, so that they'll lie above ground. — I asked them, how it could be that a pea could swell out of the ground; they could not tell that, but one of them said, he believed there was no more in it than that the rain washed the earth from them. — I asked them, what they meant by an early sowing, and when was the best time to sow peas; the farmer last mentioned said, he thought the latter end of February; — the rest agreed to it, and said, if they were sowed so early they would be likely to kid before the blight came, which otherwise would breed a caterpillar that would eat them up. — They told me little yellow worms sometimes would swarm on them.

Peas—the
season of
sowing
them.

Where elms, maples, and furze are, the butterfly, that breeds the caterpillar, lays her eggs, rather than in the peas, which shews instinct for the good of her kind; for the butterfly chooses what is best for the nourishment of her brood, not herself, who is fed by the juices of flowers, and the honey-dews.

It was January the 18th when my bailiff asked me when I would sow the farther part of a certain field to peas; he said, he would not advise me (unless I sowed them under furrow) to sow them till a week within, or the middle of March; for, said he, the land has been hard driven, and is but poor, and if sowed too early, the peas may come up and receive a check by cold weather, which they will hardly recover; it is the same with oats; therefore, said he,

about the middle of March is the best time for sowing peas in poor land, but, if you sow them under furrow, they may be sowed the latter end of February, because they will require a longer time to come up. — Ashmonsworth-down is poor land, and they are ignorant when to sow it, and commonly they sow it too early, whereby I have known that ground to have had three starts, and as many checks by the cold weather, which has brought their crop to nothing; --- it is true, added he, farmer Bond sows peas the latter end of February, but then his ground is good ground, and lies warm.

To be
sown early.

I find it is the opinion of the best husbandmen in these parts, that a good crop of peas depends very much on the early sowing them. --- Major Liver says he never missed of a good crop, if he sowed early, tho' in the coldest part of the whole farm. --- He said, it being then February the 12th (anno 1701) if the ground had been dry enough he had sown peas before that time.

Mr. Edwards assures me that on Christmas-day farmer Elton sowed the Cotshill-peas, and never had a better crop.

The hot-
spur pea to
be sown
late.

If you sow hotspur-peas in the field, says Mr. Randal, you must not sow them till May, because, if they ripen before other corn, the birds will devour them.

Of sowing
different
sorts of
peas.

This year (1715) I sowed an hundred acres of peas; part of the land I sowed with great partridge-peas, both under and on furrow, from the beginning of February to about the 20th day: these peas were sowed dry, and they flourished exceedingly, holding their own, and prospering throughout the summer. --- March 19th I began to sow the rest of the land with blue peas and poplings; these peas were all stunted, and continued in an unthriving condition, with a small leaf, and pale of colour, till about the 8th of June, when by means of warm weather

weather they grew established, and mended in all respects, and got into a thriving way; yet these peas were sown when the earth worked well, and was in season, all the peas-land having been summer-fallowed. The reason of this difference between the prosperity of the great partridge-peas, and that of the blue peas and poplings, I take chiefly to be this, that cold dry churlish winds coming, and cold rains falling from the latter end of March till the middle of May; though they had very little or no ill effect on the great partridge-peas sowed the beginning of February, because their roots were not only well established, but the ground was also by that time settled to them, yet the blue peas and the poplings had not established their roots, nor was the ground settled to them, and so they became passive both to the cold winds and the cold rains.---If it be objected, that the great grey partridge-peas are much hardier than the blue poplings, and that the difference might lie in that,---I answer, 'tis admitted that the great partridge-peas are a hardier sort of peas than the blue peas or the popling-peas; but there being at least five weeks difference in the time of their being sowed, that sets them on the level with each other in respect to their hardiness and tenderness.---And if it be farther objected, that cold churlish winds and cold rain might as well have fallen on the former as on the latter sort of peas, soon after the great partridge-peas had been sown.---I answer, we had a great deal of such weather then also; but by constant experience I have observed, that peas sowed very early, the ground being dry, and in good order at the time of sowing, do bear the cold weather, cold rain, and cold wind, which then happens, better than the peas sowed from the beginning to the middle or 20th of March do bear the same sort of weather, which usually falls about that time of the year, without respect to the tenderness

of any particular sort of peas; (for I have sown both blue peas and popling-peas the latter end of February) because it fares with grains, *cæteris paribus*, as with our bodies, viz. that cold rains, cold winds, and cold air in the months of April and May pinch us, and make us more sensible of their effects than those of February and March, when our pores are closer, and the capillaries hardened; for in April and May the sun-beams play on us by lucid intervals, and open and soften the pores and capillaries, whereby the cold penetrates deeper, and we are more sensible of it; and thus stands the difference between the young tender roots of the latter-sown peas, viz. the blue and popling-peas, because they are tenderer, and the great grey peas sowed earlier, because they are hardier, and so their roots are hardened, and struck down deep into the earth, and the earth is well settled about them before the sun from April to June acts by fits on the ground to the prejudice abovementioned, whereas otherwise, as hardy a pea as the great partridge-pea is, the stalk and leaves, if sowed at the time the other peas were, would sicken also upon the same occasion.—It may be demanded now what remedy can there be prescribed to help this; I answer,—By all means roll these latter-sown peas the first opportunity of dry weather you have, after you have sown them, the ground being then also dry; those sowed the beginning of February need it not; but be sure to roll the latter-sown peas as soon as you have half or a whole day's work for a team cut out, (which we commonly reckon from ten to twelve acres) and delay it not out of impatience to sow your whole crop of peas first, for such delays are fatal; a team that rolls ten or twelve acres in a day, can in lieu of it plough but an acre —Note, I and the whole country neglected snatching this opportunity on account of dripping weather, but dearly paid for it.

Caution—
to roll the
latter-sown
peas.

§. 81. Of

§. 81. Of the great grey Cotshill-peas three bushels and an half used to be sown on an acre, but the ground about Crux-Easton is not good enough for them; of the grey partridge-peas they sow here three bushels on an acre.

The quantity of peas on an acre.

This year (1700) peas being housed dry, the more will go to a bushel; so possibly three bushels and a peck may do to sow an acre; otherwise it is best to sow four bushels; for peas, according to the countryman's observation, never thrive well till they can take hands with one another, that is, by their strings, which they can never do if sowed thin: when they can climb up by one another they shade the ground.

July 20, 1701, I observed my peas, being well kidded, were fallen on the ground about three weeks before they ought to be hacked, from whence I did infer another benefit from sowing them thick, viz. that, by handling one another, they were able to stand up the longer before they were pulled down by the kids, whereas by being pulled down too soon, if wet weather should come, both kid and halm might rot. Farmer Biggs says, he had a servant that one year sowed five bushels of peas on an acre, for which he was very angry with him, but however he never had better peas.

Palladius tells us, and Columella and Pliny agree with him, that peas are to be sown the latter end of September, in light, mellow earth, and in a warm moist situation, and we have seen indeed, that this dry summer, 1705, has been more ruinous to peas than any other sort of grain. The quantity Palladius prescribes to be sown on an acre is four modii, or three, he says, may be sufficient; whereas we sow four bushels, that is eight modii, tho' we begin not till March, and of vetches we sow not so many as the Romans^d.

^d See the article Peas:

Of S O W I N G V E T C H E S.

§. 82. Palladius says, vetches should be sowed as early in the morning as the dew is off, and should be covered in before night, for otherwise the moisture that falls in the night may corrupt and destroy the feed.

Winter-
vetches to
be sowed
dry and
early.

§. 83. Farmer Elton told me, it was agreed to be best to sow winter-vetches dry; the ground could not be too dry for them; he said they were a ticklish grain, and it was good to sow them early, by Michaelmas;—but, said he, I once sowed them when it was so deep in wet that my horses trod as deep as the plough went, being loth to let them lie still, and people who came by thought me mad, but I never had a better crop of vetches.—Three days after I dined with Mr. Whistler, and, speaking about vetches, I said they were a ticklish grain; yes, said he, but they need not be so, if people pleased; for I was told it by a wise husbandman forty years ago, and have found it true, that, if you sow vetches very early and dry, you'll have vetches enough.—What, by Michaelmas would you have them sowed? said I.—Ay, said he, by the first of September if you can; the winter then will never hurt them; they are to be sowed at a leisure-time, when the ground may be too dry for sowing wheat.

To be
sowed dry.

Between the 29th of August and the 4th of September, 1719, I ploughed and sowed to vetches eighteen acres of a barley-stubble, which had been sowed to corn for several years before: the whole summer having been exceeding dry, the ground ploughed in ashes, and had no moisture to bring up the corn; I chose however to sow it in this condition, (tho' I had no prospect of the vetches growing without rain) because I was apprehensive, that, if rain came, the ground might fall so flat, and so close together,

together, that I should not bury the vetches. By the fourth of September aforesaid I had sowed to vetches another field of fourteen acres, a wheat-stubble, it being also all in dust. After sowing I trod them both with sheep. Notwithstanding this great drought, yet by the 19th of September the vetches in both these fields were come up, thick enough for a crop; so that it must be concluded, by the beginning of September there is, by night, a coldness and moisture in the air, which enters the earth, sufficient to make a vetch grow: barley also is of the same nature, for the barley by this time came up very thick in the first-mentioned field among the vetches, I having ploughed-in the barley-stubble.—The sowing of vetches in this manner succeeding to admiration, for, as they came up at first extremely well, so they held their own all the winter, and when I viewed them the 7th of June (the time of noting this observation) the whole crop stood as thick on the ground as the ground could well bear, insomuch that it was not only the most flourishing but the thickest crop I ever had; for, judging from their thickness, one would conclude that every vetch took root and grew.

Mr. Edwards ploughed for vetches about seven or eight days within September, but it happened to be so wet he could not sow, nor could he harrow till the 24th of October, when he told me he would not sow them till towards Candlemass, for that the middle time of sowing vetches (about St. Leonard) was the worst of all; he allowed the early sowing was the best; but, said he, the middle sowing, which is about the beginning of November, and so on, is the worst, because there is warmth enough in the earth to bring up the vetch, which will in all likelihood be tender when the frost comes, and so be cut off by it, whereas what is sown the latest, suppose before Candlemass, when the ground is cold, will,

Or, for want of an early season, to be sown very late.

will, if frost and cold weather come, lie buried without coming up, and so take no harm. This to me seems to stand to reason.

Season of
sowing
goar-vet-
ches.

§. 84. I have found by experience, that it is not good to sow goar-vetches so late as the beginning of May; for they will not, if it should prove a wet cold summer, come to a good growth and bulk, and yet will be very gross and sappy, and unfit for horses, especially when the heat of the summer is going off, as towards the latter end of August; and, if you design them for dry fodder, they will be so late ripe, that their grossness will occasion their lying out so long, as to be in great danger of being spoiled.

Mischief
from sow-
ing winter-
vetches wet
and late.

§. 85. At autumn (anno 1719) I was so late in sowing that I could not sow winter-vetches till the 18th of October, and got finish'd by the 24th. — The season was too wet, and the ground ploughed and harrowed as heavy, but not heavier, than we generally desire it should for wheat, not so wet as to tread in when harrowed; the winter continued very mild to the beginning of February, when there came a little frost; yet the vetches never thrived, but looked very dwindling, and of a russet colour, which I imputed to their being sowed so wet, and so late in the year: I believe, tho' the ground had been as wet as it was, they had not succeeded so ill had they been sowed five or six weeks earlier; and yet this ground was in a very friable condition, not clay, but a mixed land, and lies on a descent to the south-east. The vetches continued in an unthriving way till the first of February, when a hard frost came with an easterly wind, which held for a month, and it killed the whole crop root and branch.

Ground
sloping to
the north to
be sowed
early for
winter-
corn.

§. 86. If a ground lies aslope to the north or west, the earlier you sow it for winter-corn the better; because in August and September the days shorten apace, and such grounds have but little sun then, not so much as to make early-sown corn winter-

ter-proud; besides, such corn will ripen the sooner, before the sun loses it's strength over such grounds the following summer. — I sowed at the latter end of September, 1702, vetches in a field that lies from the sun, the ground being also poor; they kept blooming to the last of August, and yet were very short, and the land was white land. I sowed wheat, just by the said vetches, after Michaelmas, which ripened as early as any; but then the ground was very well maintained, which must make the difference.

§. 87. If vetches be dry they sow two bushels on an acre; if swelled with being moist, two bushels and an half, because they take up more room. Quantity of vetches on an acre.

Three bushels of winter-vetches on an acre is more than is commonly sown, especially on white land, because they generally kid well on such land, but I think three bushels not too much for red land, because they may kid the better for it, and not run so much to halm.

§. 88. It is good to have such plenty of winter-vetches, as to be able to save seed in halm for sowing the next year; because it is best to sow them early, i. e. by the beginning of September, vetches of the same year's seed being seldom ripe so soon, nor can they be got to be threshed till Michaelmas. To save seed for sowing the next year.

§. 89. A neighbour of mine was imposed on, and instead of the winter-vetch bought the summer-pebble-vetch-feed, which he sowed, and, though the winter proved mild as ever winter did, yet in March they were all dead, and the land was ploughed up again; which I mention as a caution to others. The pebble-vetch is a summer-vetch, different from the goar-vetch, and not so big; they call it also the rath-ripe vetch. Care not to be imposed on in buying seed.

§. 90. I was telling farmer Pocock of ——— Vetches two year old will grow, also up peas.

up well.—He replied, that he had sown great partridge-peas the second spring after the harvest, and they grew very well; but, says he, I kept them in the mow till near the time I sowed them, for otherwise, as he supposed, had they been threshed long before seed-time, they would not have grown so well*.

OF SOWING TILLS.

Tills—best
on good
land.

§. 91. Going from Crux-Easton to Holt I observed in the fat strong clay lands between Pewsey and Devises beans on one ridge of land, and tills on another, and so to continue interchangeably for some miles.—I thought tills had always been sown on light and poor land; therefore I asked a farmer I met whether tills grew well on such land; he said, the stronger the land the better the tills.——I asked him if they sowed not tills on two earths, the ground being so heavy; he said, sometimes they did, and sometimes on one earth, as the land worked.

Time of
sowing.
Quantity
on an acre.

Again I asked him, when they sowed the tills, he said before their barley, that is in March. I found by him that two bushels, and two and an half, were sowed on an acre: the tills on that land were the best I ever saw.

To sow
barley with
tills.

§. 92. I was advised by the country-people, where tills are much sowed, to sow a bushel of barley in every acre of tills; they said it would serve the tills to climb up by, and the rudder would easily separate them.

Quantity
on an acre.

§. 93. I told my neighbouring farmers that between Pewsey and the Devises, in mighty strong land, they sowed two bushels, and two bushels and an half, of tills on an acre. They replied, it must then be because, their land being so strong, if not sowed

* See the author's remarks on Vetches.

thick,

thick, they would run too much to halm, but in poor land they thought a bushel and a peck on an acre was sufficient.

OF SOWING GRASS-SEEDS.

§. 94. That seeds will not grow unhulled, or extra cotyledones, see the Experiments made by Malpighius in beans, lupines, &c. yet quære; for we know hop-clover unhooded grows well; but then that hood seems the pod rather than the rind or cotyledon, the rind going and growing with the seed still. The bran or cotyledon is taken off of oatmeal; quære of that therefore, and whether it will grow.

§. 95. James Young my tenant in the Isle of Wight and I were talking of clover-seed: he said, he had been acquainted with a husbandman who lived about Guilford in Surry, who told him, the method of sowing it there was, after the barley was sowed, to roll the ground, which laid it so smooth that the clover-seed might be delivered as even as you pleased, and then to sow it, and give it a tining-in.

Method of
sowing
clover in
Surry.

§. 96. My bailiff, who was many years a farmer, assures me, that in the hill-country of Wiltshire he has often known hop-clover and broad-clover-seed sowed with wheat, and it has born the winter very well; he has likewise sometimes known clover-seed sowed among green wheat in March, without harrowing it in, with good success.—Another, a Wiltshire farmer, told me he had often known hop-clover sowed with the wheat in Wiltshire, and he thought it the best way, especially if the ground was out of heart, for then it would pay better than taking a crop or two of corn after the wheat; one gets a year's forwardness of the clover by it.—He says likewise, that not far from Puckshipton, where the ground is pretty rich, he has known the hop-clover,

Of sowing
clover-seed
with wheat,
barley, &c.

Of sowing
broad-
clover with
wheat.

clover sowed a month after the barley, lest it should prove too rank;

§. 97. In September, 1719, I sowed broad-clover-feed with my wheat on twenty-nine acres of land; I dunged about seventeen acres of it with cow and horse-dung, and the rest with the fold, or with pigeons-dung, or malt-dust; I laid, I believe, near forty load of pot-dung on an acre: it proved an exceeding mild winter, with a cold and wet spring and summer, insomuch that near a month before harvest the wheat lodged: I had a very great crop of wheat, yet, notwithstanding the dunging and the mildness of the winter, and the frequent rains throughout the spring and summer, the broad-clover did not at all injure the wheat, though the wheat-harvest did not begin till the 20th of August; then I began to cut this wheat, but the broad-clover was neither rank nor high, so as to prejudice the wheat, but seemed rather to be too thin set on the ground, nor had it made any effort towards flowering; yet by a fortnight after the wheat had been cut the broad-clover appeared very thick on the ground: even so as in many places to be matted; the leaf also was very rank, fat, and gross, notwithstanding natural grass grew up with it.--What deserves farther to be observed in this case is, that in the spring of the year the wheat came so very gross, that, for fear of a lodgment, I was forced to put my whole flock into it for three mornings to feed it down, and they without doubt fed on the young broad-clover as well as on the wheat, yet it seems such feeding did the broad-clover no harm.

Of sowing
broad-
clover in
wheat in
spring.

§. 98. The 10th of October (anno 1720) I went into my neighbour's wheat-stubble to view the broad-clover he had sown among his wheat in the preceding spring, and before he had rolled it.—He was of opinion it succeeded very well.—I found the broad-clover to have come up very thick, but it had
a very

a very small leaf, and was less sappy than my broad-clover sown when I sowed the wheat, which makes me conclude, that the seed sown so late could not penetrate with it's root into the ground so well as mine, nor find nourishment and maintenance like my broad-clover sown with the wheat, when the ground was new harrowed; therefore it is my opinion, that, when spring comes, the late-sown seed will decline and fall off.—I also observed his clover thrived better where the ground was mere clay than where it was mixed earth; and note, this had been a very wet spring and summer; otherwise, sowing his clover as he did, he would have had but little come up.

§. 99. This harvest (anno 1720) farmer Crapp of Ashmonsworth, Hants, assured me, that, it having been a wet and cold spring and summer, he was worse in his barley by 40 l. for sowing broad-clover with it; for four or five weeks before harvest the broad-clover had so eat out the barley, that the straw dwindled, and carried no substance, and the barley had but a thin body, and, when it comes, said he, to be threshed on the floor, it will thresh so heavy, that there will be no threshing it out for the broad-clover, which will deaden the stroke of the flail.—He says, if broad-clover be sowed with oats, it does not do well on one earth.

Broad-clover damages barley, if a wet spring and summer succeeds.

It seems to me, that since broad-clover must be sowed in good strong clay-land, the rath-ripe barley is the fittest to be sowed with it, because it also requires good land, but more especially because it will be early ripe before the broad-clover can grow to that height as to prey much on the barley, or so that swarths of it must be cut with the barley, which may occasion the corn's lying out the longer, for the broad-clover to wither; it will also be cut before that time of the year, when the dew falls in great quantities on the broad-clover-grass, which would

Of sowing it with rath-ripe barley.

Of sowing
it with
oats.

revent the barley from being dry enough to be housed.

Since so much has been said of the damage that broad-clover often does to a crop of barley, for the better security against such evils, it seems reasonable to me, to lay down to broad-clover with a crop of oats: first, because, being sowed earlier with oats than with barley, it will not be in danger of growing so rank.—Secondly, tho' it should grow rank, it will not prejudice the oats as it would do barley, because oats may lie abroad a week after they are cut, and take rain without damage.—Thirdly, the ground laid down to oats is commonly in a poorer condition than ground laid down to barley, and therefore the broad-clover will be less liable to grow too rank.—Fourthly, oats are generally ripe before barley, and housed before the feeding weather of autumn comes, especially on the latter-sown barley, which sets the broad-clover a growing, and makes it very rank before the barley can be cut.

The farmers of Wiltshire choose rather to sow broad-clover with black or white oats than with barley, provided the ground works up mellow, and they say, the broad-clover will be the better crop, and the more certainly so, for being sowed so early as the oat-feed-time, nor will it ever hurt the oats.

*This whole section is inserted §. 12. under the article Harrowing; but the first paragraph ending with the words—to tear it—is repeated here.

Of hop-clover sown on wheat-stubble without harrowing.

* One of them, a very understanding man, speaking in relation to his sowing broad-clover with his oats, told me, that he always dragged them in with their country drags (which are not so big as our's, and have six tinings on a harrow) and this he does, tho' his ground had been ploughed up but a fortnight before; but he commonly sows broad-clover on ground ploughed so long before as Candlemas, which never will, tho' it works mellow, fall too close for the drags to tear it.—

§. 100. Mr. Randolph and Mr. Short Baily of Wiltshire discoursing with me about hop-clover-feed,
Mr.

Mr. Baily assured me, that having once two or three quarters of hop-clover-seed by him, and having a wheat-stubble, which he observed the following spring to be pretty clear of weeds, and pretty hollow, he flung in his hop-clover-seed without harrowing it, and had as good a crop as at any other time. This he said on an occasion I gave him, by saying, I would try an experiment on my side-lands by sowing them with rye-grass at spring, on the oat stubbles, harrowing them in.

§. 101. A noted farmer, near Uphaven, informed me, that it was the best way to sow hop-clover with French-grass; that he sowed seven bushels of French-grass on an acre, and with it a good sprinkling of hop-clover; the advantage of which was, that it filled up those spaces that missed between the French-grass, and kept down the weeds till such time as the French-grass could overcome all.

§. 102. It is my opinion, that, if the ground works light and fine, French-grass-seed ought to be sown under furrow, because (as I have elsewhere observed) if it be sown on furrow, it is apt not to be healed.--- To which add, that French-grass-seed in it's husks, being very prickly, is not apt as the harrows move, to fall deep into the earth, and tho' fallen deep enough, yet by means of the prickles which catch hold of the earth, it is apt to be harrowed up again.

About Crux-Easton the farmers think they cannot sow grass-seed too deep, sowing it often with corn, and harrowing it in afterwards; and I have known hop-clover mowed for seed, which, standing too long, shattered, and after the grass was mowed, wheat was sowed under furrow; the ground was harrowed fine, and the hop-clover came up with the wheat as thick as could be desired, so that I am satisfied, if the earth be light at top, there is no danger of burying it.

March the 12th (anno 1707) I sowed French-

grafs-feed under furrow : no rain material fell till the 22d of May, being near ten weeks, during which time the sun was very hot with dry winds and cold nights : in this dry time I often scratched up the ground, and found the lobes or seed-leaves out under ground, but, tho' sown under furrow, at a perfect stand, not able to advance farther without rain, and before rain came, the seed-leaves did a little languish, and seemed to have spent their stock of juice, so that I began to fear the crop would die under ground ; but plenty of rain coming, I did between the 30th of May and the 3d of June observe the seed-leaves coming plentifully out of the ground, which was near three months after sown. I likewise observed some oats, sown under furrow the 18th of March, appearing the first of June ;—I also observed many stems of these French-grafs-seeds to be bit off under ground, by worms, they not being able to get food above ground by reason of the drought : the insects of the field are a great prejudice.

Damage
from
worms.

Grass-feed
may fail by
sowing it
on wet fal-
lows.

§. 103. Many have sown grafs-seeds when fallows have worked wet, and have had no grafs, which might as well happen from the wetness of the ground as the badness of the seed ; for if barley, which carries so strong a blade, can hardly get through ground that binds by wet, how should it be expected of grafs-feed so sown, the blade of which is so much weaker and tenderer ? I alledged this to a good farmer of my acquaintance ; he replied, that, as he thought, grafs-feed could not fall in so deep as to be bound.---I answered he was mistaken, for the last tining of the harrows let in the grafs-feed as deep as the first did the corn, of which I convinced him by going out and digging up the feed.

Broad-
clover, &c.
to be
sown thick.

§. 104. I hold, that in the hill-country, broad-clover ought to be sowed thick, because the grafs will be finer for sheep, not so gross as otherwise it would be, and consequently, if rain falls, it will quickly

quickly be dry, and, if rain should not fall, the hay, when mowed, will be the sooner made by four or five days, and being cut in it's juice before the flower dies, it will not take the damage that it would do, provided it was cut ripe.

I was complaining to farmer William Sartain of Broughton in Wiltshire that my broad-clover at Easton was very sour, occasioned by the coldness of the land---He said, if I sowed twenty pound of broad-clover on an acre instead of twelve or fourteen, I should find it the sweeter and finer for it, and it might be farther improved in sweetness, if I fed it very close, and did not let it grow to any height.

In discourse with Mr. Randolph, and Mr. Short Baily of Wiltshire, Mr. Randolph highly commended the sowing all grafs-seeds in a greater quantity than was practised, especially, said he, French-grafs-feed; for, if it be not sowed thick, if a hot summer comes, it will burn, and other grasses, if they be not sowed thick, will grow gross, and then, if at mowing-time a difficult season should come, the crop must stand till it is a little over-ripe before it be cut, and so it will lose it's goodness, whereas, had it been fine by means of sowing thick, it would take little damage.---In Wiltshire they generally sow three or four bushels of rye-rafs-feed upon an acre, and Mr. Raymond advised me by all means to sow no less than three bushels of hop-clover on an acre; for, said he, if you sow but two bushels, you will find abundance of vacancies, which would have carried grafs, had the seed been dropped there, the vacancy not being for want of strength in the land, but because it had no seed fell in it.

§. 105 Seeds or kernels that are conical, as much as I have observed, have their root and spear at the narrow end, whereby, when they fall, that end inclines most to the ground. ^{Of conical seeds.}

* See our author's observations on Grasses.

EXPERIMENTS on the GROWTH
of SEEDS.

Of the
pearly
drops on
barley, and
their use.

§. 106. I had often observed in the spring-time, when the blades of barley first began to shoot out of the ground, dewy drops standing every morning on the points of the blades, even when the grass of the field, which was run into leaf, had some mornings no dew thereon; this made me believe they proceeded not from the descending or circumambient vapours of the air, but from juices drawn up by the roots, which passed upwards through the tubes and issued out at the top, which according to my conjecture was true, as appears by this experiment I made.--I took a pot of fine garden-mold, and placed it in my study; the earth was but moderately moist, and I put into it a handfull of barley; when the barley shot up about half an inch or an inch, at the end of the points appeared the said pearly drops; I wiped them all off, and carefully took up half a dozen of the blades of barley by the roots, then with a pair of scissars cut off the roots close to the grains of corn, and covered them in the same earth again; the next day I looked on the blades, and found the pearly drops of water settled on the blades as before; but on the tops of those blades, whose fibrous roots I had cut off, not the least moisture appeared, tho' the blades continued in a good verdure through the moisture of the earth they were put in; this shews plainly, those watery globules are not collected from the moisture of the outward air, but from the juices drawn upwards from the roots. I again wiped off the said drops, and within three hours after found the tops of the blades were supplied with fresh drops, which trickle down the stalks when they swell to such a bulk as to break, and again soon renew themselves. This experiment was made in a mild

mild time in December. From hence it appears that moisture must hold proportion to the roots; and it gave me farther occasion of admiring the wisdom of God in this appointment; for observing that these exsudations are, as soon as the sharp-pointed blade appears, continually sent forth, we may ground our judgment on reason and probability, that this moisture immediately begins to discharge itself, as soon as the spear is shot thro' the end of the barley-corn, which softens the earth upwards, as the blade pushes forward, and facilitates the easy passage of the spear: I conjecture it is the same in all the grassy sharp-pointed plants for the same reason. The roots of corn and beans also terminate in a sharp point, as they tend downwards, and, seeing it is so in the spires which ascend, I do very presumptively suspect, that there is a continual exsudation of a moist liquor from the points of the roots, to moisten and soften the earth before them, the more to facilitate the roots penetrating downwards, as it helps the blade to push upwards.

§. 107. Tho' this last summer (anno 1711) was a dry summer, yet it was not a hot summer by any means: I malted barley in November which had taken no wet in harvesting, and was seemingly very dry and hard: I wondered to find in every handfull I took in the malt-floor at least one hundred grains that did not come: I stayed till it came round to the kiln, and then took twenty of the grains which did not sprout with root, and put them the third of November into a flower-pot with very good mold, and set the pot in my study. Mr. Raymond came to see me, and, he being present, on the 13th I opened the earth in the pot, and found fourteen barley-corns of the twenty had put forth roots, but had not speared: the other six had not in the least made any proffer towards putting forth a root, which I concluded were dead corns. From hence we may easily

A cold soil will not ripen corn so as to make it fit for seed. Experiment on barley.

ly judge how my land, being cold in nature, and coldly situated, ripens not barley to perfection but in the hottest summers, and that this barley, which came not till nine days after it had been taken from the last floor, would have proved very coarse and edge-grown barley, had it been sown in the field; it also seems plain from hence, that not only when the barley takes wet in harvest, and is cold by reason of a wet summer, but even in all but the very hottest summers our barley should be sweated on the kiln in order for malting.

It is now further to be observed, that the very same barley, out of the same field, and of the same goodness with the twenty grains abovementioned, and which also had not taken wet in harvest, after the floors had been seasoned with drying off two kilns, did so far root, that out of a handfull of it, when it had so past the floors as to be within a week of the kiln, I did not find above thirty grains, which did not shew a root. Note, it is to be understood, that by drying off two kilns, and carrying the malt through the floors, the floors and house had been so warmed, which is very sensible to the smell and feel, that thereby the vegetative powers of the barley were forwarded and more exerted by such heat: this experiment still shews how wrong it is to sow such barley, especially in a cold ground and cold country, to the growing of which warmth is more necessary; and tho', as I observed, most of this barley did come, yet much of it did lie so many days backward, that it might be doubted whether it would make above half malt; it is to be believed therefore it might prove, if it came up in cold land, an ustilago or burnt ear.—*From hence I conclude that wheat, if it handles cold and heavy, will do better the earlier it is sowed, whilst the season is warm; for if sowed late, by reason of it's own innate coldness, it will grow much worse, and be longer coming up;

*Inference, that peas also and wheat, from a cold soil, are not good for seed, or must be sowed early.

up; from hence I also conclude, that peas cold or black by reason of a wet harvest, and cold oats, ought by no means to be sowed in cold land.

§. 108. I took nineteen grains of barley out of a heap that past the floors of my malt-house, and was to be dry'd off in a week's time, which made no shew of a root, and on the 17th of November I put them into a flower-pot of earth; I observed three of them had shot blades in five days time above the earth, and on the 27th of November, which was ten days after I had put them in earth, I took them out, and found four more grains were speared under ground, and had not yet appeared, the spears being short; and I found the ten remaining grains rooted with four or five roots, but not speared, as yet appearing; but on opening the rind found the spears alive, and that they had run near the length of the grain under the rinds: these instances plainly shew the different degrees of virtue in the stamina of seeds, and how far some stay behind others, which must be of ill consequence when grain of the most perfection is not sown, especially when such indifferent seed is committed to cold ground in a cold clime.

§. 109. In order to make a fuller experiment of this matter, I tried different grains from different soils.

February 8th 1711, I put into a flower-pot two hundred grains of black Poland-oats, marked numb. 8.—The same day I put into a flower-pot two hundred grains of Easton-oats, marked numb. 9.—March 16th both these and the Easton-oats were come up an inch in spear; by the eye I could discern no difference in the number of each come up; (they seemed to be all come up; viz. two hundred of each) but, on examining with the eye only, it was plainly discoverable that the Poland-oat came up with the stronger spear, and March 27th, after both sorts of oats had been some days in blade and leaf,

The different degrees of virtue in the stamina of seeds.

A farther experiment to shew the necessity of sowing good grain, and from a good soil.

leaf, it was as discernable, that the leaf of the Poland-oat was somewhat broader than the leaf of the Easton-oat, and the stem proportionably stronger.

February 8th 1711, I put into a pot two hundred grains of barley, being very coarse, cold, and thin corn, marked numb. 5.—And in another pot two hundred grains of Westover barley, marked numb. 6.—And in a third pot hundred grains of my best barley from the down, marked best, B. numb. 7.

March 13th there appeared but five of numb. 5, in blade, whereas of the Westover and my best barley appeared half an inch above ground almost all that were sowed.

March 18th of the worst barley appeared as near as I could reckon eighty-five blades.—Of Westover barley I told above double the number, which being thick I could not easily count right, but believe very near the whole two hundred grains were in blade.—Of my best barley I believe I might not have by thirty blades so many as there were of the Westover:—it was also manifest that many more of the blades of the Westover barley, and my best barley, had from time to time dew-drops on them than had the blades of the coarse barley; also the drops of the former were larger.—I could also easily discern, if I looked attentively, that the Westover barley carried a broader blade than my best barley, tho' my best barley seed seemed as full bodied as the Westover.

March 27th I opened the three pots of barley, and was surprized to see how the Westover barley and my best had struck roots down to the bottom of the pot, the tap-roots were above eight inches in length and had matted in the bottom, wanting depth to strike deeper; most of the roots of the Westover barley had struck seven, eight, and nine roots; my best barley did not so often run to seven and eight fibres or roots, but more frequent than the Westover to five or six.—The coarse barley very rarely run

to seven or eight, but more commonly to four and five;—and I commonly observed some of the collateral fibres or roots to be very short.

From all the experiments I have made by sowing wheat, barley, oats, and peas in flower-pots within doors, I found that, though the earth was rich and well moistened when I first put the corn in, yet all the said grains would hasten up to spindle with a maiden spear, without tilling; which shews that when ground of the field wants either strength, thro' poverty, or convenient air and moisture, it will do the like, and when corn in the field does so, it is a certain sign of some deficiency; for the tilling of plants proceeds from a redundancy of humours, or a good quick air that agitates them, whereby the maiden stock being sufficient to receive the vegetable juices, there must be an irruption into collateral branches. — I cannot but in a great measure impute the abovesaid defects in the seeds I sowed in the pots in my study to the want of, and the stagnation of the air; because the earth, when I examined it, did not seem so very arid and exhausted of juices, but that the plants might have better flourished, considering the goodness of the mold.— But I believe the collateral branches to be as perfect as the maiden plant in the seed; and this vegetation to be no new formation, but an extension of parts only.

As the experiments I have made therefore of sowing corn in pots of earth were within doors, where it seems to me, for want of motion of air and a quick succession of it, the juices stagnate in the plants, and are not pushed on to tillow, but run to spindle, and as by the experiments of malting barley, which in windy weather, when the air is plentifully forced into the bodies of plants, runs out to root and to spire in a hasty manner, ⁸ I doubt not but, when I can make

⁸ Of the great quantity of air contained in vegetables, and it's various uses, see the articles Air and Seed in Mr. Miller's dictionary.

make the experiments of sowing corn (as before within doors) in pots of earth placed out in the air in the month of April, when the earth shall be the same, the water which waters both sorts of pots be rain, the inlet of the southerly sun through the glass window the same position, and the warmth within doors rather greater, I shall then better discover the beneficial powers of air to plants, by comparing the difference; from whence just reflections may also arise, of how great consequence salubrious and plentiful haustus of it must be to our human bodies.

Of vegeta-
tion in ge-
neral.

§. 110. It is a difficult task to unfold and ascertain the complicated principles of vegetation (as they are more or less in all sorts of earth, and as they not only quicken or impregnate the seed, but carry it on through all it's gradations, of woody, leafy, flowery, and fruit substances) so as to know how to proportion them, or say in what manner and proportion they act and perform their several offices.

For though experiments have been made of nitre, blood, soot, &c. all which have been found great forcers, so as to bring forward the leaves and branches of a plant, yet it may be the flowers or fruit, either in bulk or number, may not equally succeed by such mangonism; few I believe having had the patience to make an exact experiment

ary.—Lettice-seed, that was sown in the glass-receiver of the air-pump, which was exhausted and cleared from all air, grew not at all in eight days time; whereas some of the same seed, that was sown at the same time in the open air, was risen to the height of an inch and an half in that time; but, the air being let into the empty receiver, the seed grew up to the height of two or three inches in the space of one week.—When seeds are packed up for exportation, great care should be taken, that they are not shut up too closely from the air, which is absolutely necessary to maintain the principle of vegetation.

Seeds sent from abroad in sealed up bottles would not grow when sown.

Seeds being hung up a year in bags, and others from the same parcel being kept a year in bottles sealed hermetically, the former when sown grew well, but none of the latter came up.

throughout

throughout the aforesaid course of vegetation, or if they have, they may not have rightly considered what other mixtures there are in the earth where-with these menstrooms may co-operate.

To make a just experiment of this kind, I conceive the naturalist ought to take earth very much emaciated by hard ploughing (if it were reduced to a caput mortuum it would be much the better) and to lay some loads of it in different heaps apart, and to impregnate each heap with a different and most simple manure, and by equal measure, and then to plant it with the same seeds; it would be also proper that one heap of this earth should be left in it's natural strength, and seed sowed in it, to see the difference.

I should also propose that many parcels of the same earth were taken out of a corner where the plough cannot come to stir it up and impoverish it, and that the same experiments were repeated, and a trial made as before what a parcel of this earth could do by it's own virtue;

Also, that in the like parcels of earth different mixtures were made and blended together of the said menstrooms, in order to see the success of such compositions;

And when all this is done, if I may be allowed to anticipate the event, I may venture to pronounce the project will be in a great measure fruitless; for though by this means may be in a great measure discovered what are spurs to nature, and what will produce the desired increase, yet to transfer such discoveries into the course of husbandry will be impracticable, by reason of the expence, nor will it explain and discover the principles of vegetation, as to the cause, so as to make a person the wiser, though we know whereby to give the production; because I conceive these menstrooms taking in with them the latent and concurrent powers and virtues of the air, earth,

earth, water, sun, and temperament of soil with which they are blended and digested, make a certain union and texture so incorporated and interwoven, that they are not easily separable (unless by fire) from whence results a third principle, or quinta essentia, which performs these mighty wonders of nature; so that from these happy mixtures does arise a specifick which God wills shall do, and therefore does these great things.

Wherefore by experience we say of principles in vegetation with physicians in medicaments, that, as such and such simples are of themselves profitable towards curing particular distempers, so when taken in composition (as Sydenham professes) their efficacy is much greater.

This vegetable balsam, tho' so difficult to say wherein it consists, yet it may be averred, is as easily to be seen as understood; for tho' almost as subtil as a phantom, yet it's marks are easily discovered to the diligent husbandman conversant about arable land: we can easily perceive by the different colour of our land (as it turns up under the plough) whether it has born one, two, three, or four crops, and how in proportion the virtue is gone out of it; and as sensible we are by it's rest, and lying to pasture, how with it's vigour it renews also it's colour; we do not better see and know when the plumb or grape is covered with or has lost it's bloomy blue, than we know by the colour the fertility of our soil, which colour arises from the principles before intimated, of dung, air, fire, earth, &c. mingled together, which by often sowing are absorbed into the corn in too liberal a manner to be renewed by a daily recruit from those elements.

Cause of
good land's
soon reco-
vering it's
strength,
and bad
land not
doing it.

§. III. There is one thing not easily reconcilable, and which may well afford matter of speculation to the curious, which is, that very good earth, tho' exhausted never so much with ploughing (so that

that it will not bear a crop of corn) yet will in a few years recover by rest; whereas land poor by nature, and yet capable of bearing as good a crop as the land good by nature, when it's strength was at lowest by being over-wrought by the plough, shall make but a very ordinary improvement in proportion to the other land, and never exceed a certain fecundity, which is it's ne plus ultra; and yet both these soils equally exhausted one would think started fairly together, and stood on equal terms and advantage of imbibing the aforesaid elements, and these are all the materials and talents they have to improve from. — I am at a loss what solution or tolerable account can be given of this phænomenon, unless I say, the earth, which was good by nature, consisting of a just and happy texture of parts, fitted by a due continuity and unity to receive the aforesaid elements, and yet not so close as to retain and imprison the watery and firey parts till they putrify and corrupt, but till by a kind fermentation the spirituous parts are converted into fixed salts, do then let through, and suffer the fæces to be washed away, or to be purified by the continual free access of the elements; whereas, on the contrary, the abovementioned poor land, either by too strict a bond of union (as clays, before they are friable by art) are too compact and consolidated to admit the benign influences of the elements, or else they retain and imprison the immissions, till, for want of ventilation and circulation, the stagnating juices grow sour and acid, and, by reason of the coldness of the earth they are shut up in, are not capable of a sufficient fermentation to be converted into fixed vegetable salts.

The other sort of poor land, which being once impoverished is a long time before it recovers, runs into a contrary extream, viz. that of too loose and light a mold, which may be compared to a person under a dysentery, who has no retentive faculty; through

through this the nourishment passes with that precipitation as not to abide long enough to receive a fermentation; but the spirits, and all the fat substance received is washed away and carried downwards undigested, and so such ground can receive but slow recruits from the elements.

Or shall we say, the recruit good land receives, after it is impoverished, seems in a good measure to arise from the effluvia of the layers or beds of earth, many feet deep, which are exhaled into the upper surface, and by the heat of the sun converted into fixed salts; for generally the better and richer the upper coat of the soil is, the lower veins of earth are in some proportion answerable and correspondent thereto.

R O L L I N G.

No roller
amongst
the an-
tients.

§. 1. **I** Cannot find, as I observed before, by any of the Roman writers, that they used a roller in their husbandry, but only a crates, that is, a hurdle or flat timber, to draw over their corn, to level the ground. See Columella, lib. 2. cap. 18.

The Spa-
nish instru-
ment like
the crates.

§. 2. In Spain, after their summer-corn is sown, a horse draws a broad board of about ten foot long, a boy standing on the board, and driving over the corn, which serves instead of a roller.

Whereas above, the long plank is described to be drawn as a roller, Lord Pembroke rectified my notion, and told me, that the plank is drawn at length after the horse, as he has seen it; for, said he, otherwise a horse could not draw it, and this way there is an equal weight on the earth for the space the board covers, as there is on the breadth of earth covered by a roller, whereas, had the plank covered the earth, and been drawn the same way as a roller, it would be too light to signify any thing.

§. 3. Treading

§. 3. Treading wheat, after it is sowed, by folding sheep on it, is allowed to make it closer than rolling it, in regard rolling only lays the ridge of the furrow flat, but the sheep's feet find every little hollow place, and tread it close.

Treading
wheat with
sheep.

I asked Mr. Edwards whether the farmers in Leicestershire rolled both barley and oats; he said, yes, they always did, and wheat too, except they folded it, but he never knew them roll peas.—I asked him why they rolled not the wheat they folded; he said, because that needed it not, for the fold trod it harder than a roller could press it; for which reason they endeavour, as much as they can, to fold on the light land. He said a roller could not be too heavy, tho' it was as much as five horses could draw; that the land by good rolling, if there wanted rain, bore the hot weather much the better; the roller also broke the clods, and made way for the corn to come up through them.

In Leice-
stershire.

§. 4. If corn be come up, and then rolled with a very heavy roller, the five or six horses that draw it, going all in a line, and treading in each other's steps, often bruise and hurt the corn very much, for which reason it is adviseable to draw such a roller with horses on breast, side by side.

Caution to
roll with
horses on
breast.

§. 5. They are forced to make use of very heavy rollers in our hill-country to roll over the flints among the barley and oats, otherwise there would be no mowing them; they often use them likewise in March to press the ground somewhat closer to the corn.

Heavy rol-
lers in
Hants.

§. 6. Major Liver says, he rather approves of two rollers, that may be drawn by three horses apiece, than one heavy one that requires six; for, said he, the light ones make double the dispatch; besides, if the great roller be used in clover-grass it will be apt to bruise the bulbous root too much, and if used on corn-ground, tho' never so dry, (whereon it will do most good) the horses will

Two
lighter rol-
lers rather
commend-
ed than one
heavy one.

break it up so much with their heels in straining, that it will not be healed again by the roller's coming over it.

As it is of great consequence in the hill-country, at seed-time, in dry seasons, to break in the earth after the sown corn, the same day it is sown, with a couple of harrows, so I think it is of as great consequence that a roller, or a couple of a small size, such as one horse, or two at most may draw, be kept in readiness, to settle the mellow and hollow earth close to the roots of the corn, without compressing it too close; for tho' corn loves to lie easy, it loves also that the earth should lie close about it, that it may go immediately on it's work of shooting forth it's roots to the best advantage. If the ground works any ways dry, or in powder, this will be found to be the best way in the hill-country, to prevent the sun's penetrating too deep by reason of the dry and light mold,—and then, after the corn is well come up, the great roller may go over it as usual.

Of rollers
with nails
in them.

§. 7. My bailiff said, he had seen rollers, on which nails had been drove as thick as it could hold to save it from cracking, and from wearing with the stones;—but I think such a roller could not do well to roll stony land, when the corn is come up, because the nails would be apt to cut off the corn.

Rolling
saves seed,
a less quan-
tity will do.

§. 8. In conversation with several farmers on the subject of rolling, and in speaking in commendation of rolling after the corn was sowed, they said, that half a bushel of oats might be saved in sowing an acre by securing the earth, and laying it close to the corn; if a rascally team, said they, were bought for that purpose, and sold off again, it would pay the purchase of the horses.

*Spungy,
ferny,
loose.
A heavy
roller
for wood-
seer ground

§. 9. I believe that a * wood-seer ground should have the great roller, if it be never so big, go twice or three times or oftener over it, after it is sowed to summer-corn, and after rains, to consolidate, if possible, an iron-mold-ground, consisting of coarse harsh disjoined

disjointed particles ; for both cold and heat penetrate it, and, by changes, make the corn die to the root, but at length, getting more strength by this compression, the root may be enabled to live, and maintain it's blade.

§. 10. In harrowing after sowing, it should chiefly be considered how smooth and fine your ground lies, in order to settle, and, if any of your ground lies rough and knobby hard, it seems that the smooth loose land should be first rolled, and the rough knobby land be deferred in hopes of a shower of rain to mellow and loosen it, not only because the knobbs will then break, but also because their being so hard may bruise and cut off the tender blades of corn.

What sort of ground to be first rolled after sowing.

§. 11. Rolling as soon as possible after sowing summer-corn will in a great measure prevent edge-growing, in case of a dry season ; for the lower corn laying moistest, would, unless rolled, come up long before the other ; but that which lies shallower, the crust of the earth being scorched, could not get away without a good shower, and perhaps be malted first, whereas rolling soon, if it be dry, brings it all up together.

Rolling soon after sowing prevents edge-growing.

§. 12. When the ground is wet, or after a little rain fallen, it is not proper to roll, because the earth will cling and gather to the roller ; and also when land is wet, rolling after sowing may be ill husbandry, because it keeps the moisture so much in the ground, especially if early in the spring, that thereby the corn will be chilled.

Not to roll wet ground after sowing.

§. 13. If corn be well come up, and wet fall, it is generally proper to roll the last sowed first, because such corn has less dew, and the earth dries fastest.

What corn to roll first when come up.

§. 24. They seldom roll their wheat about Holt in Wiltshire, and observing the surface of the wheat-ground to lie very hollow and dry, and one's feet to sink deep into it, it being in March, I wondered at it, and spoke to Mr. Randolph about it.—He said, in their country they seldom found their wheat suffer for

Why they roll not their wheat about Holt in Wilts.

want of rolling, because they ploughed round furrows, and laid their corn in deep:—on which he and I went into Mr. Byssy's wheat, and I found, tho' it was hollow, yet the corn lay about four inches deep, and from thence took root downwards; however we both thought rolling would not do amiss.

Of rolling
wheat soon
after sown.

§. 15. Mr. Carter of Colehenley and Mr. Longman assure me, that they have rolled their wheat soon after sown when they can get a season for it, and it has always been much the better for it; and farther, that wheat so rolled has this advantage, that there is generally more leisure for rolling soon after sowing wheat than after spring-corn, and it closes the ground to the roots, and prevents the winter-cold from penetrating, nor can the worms so easily turn up the earth from the roots of the corn; and by experience it has been found, that such grounds bear the high winds the better for being smooth; for the wheat itself breaks the wind, and each blade shelters the other, and more especially so the lighter the ground was before rolling, just as a drab-coat is warmer to us than a spungier cloth of the same thickness; and, when the March-winds blow, the earth of such rolled ground is not so easily carried away from the roots of the corn as that of rougher ground is. Mr. Carter says, about Basingstoke they always roll in the same manner.

At a meeting of several good farmers I discoursed with them on the subject of rolling wheat soon after it is sowed, and said, I could not see any inconvenience in it, but that it must be good husbandry; for I could not apprehend how by laying the land flat the wheat should lie the colder, or, if it did, what signified the blade being taken off by the winter cold so long as the root was well fortified by the earth's lying close to it; yet I should not always approve of rolling till I saw the approach of winter, lest by rolling too soon after sowing, especially if the beginning

ning of winter proved mild, it might bring the wheat away too fast, and make it rank. To this they all assented.

§. 16. The autumn anno 1715 was so very wet, Of rolling in the spring and after a hard winter, wheat that was sowed late and wet. the country people could not sow their full crop of wheat, and, whereas I intended to have sown one hundred and sixty acres, I could sow but one hundred and twenty, — and one third part of that I could not get into the ground till between the 10th and 20th of October. The winter proved extream cold and snowy, and the snow lay deep and long on the ground: the wheat of the country in general, as well as mine, was pinched by the cold, and stopt in the ground during the whole winter, especially the latter sown, and in the spring, when the snow went off, from the end of January to April we had no rain, but drying churlish cold winds with frosts; so that towards the end of March the wheat was very poor and weak, insomuch that a traveller could hardly take it to be wheat. — Being sensible the ground must lie hollow from the roots of the wheat through such extream frosts, and also want moisture by reason of such dry winds and want of rain, I rolled my wheat at a time I could ill spare my horses from sowing spring-corn, but it was wonderful how much it began immediately to thrive after such compresure of the earth to the roots of the corn, and how much it contributed to the colour, which was visible in a day or two after rolling, and it continued to improve proportionably, though the cold winds and drought still continued.

If wheat turns yellow, or looks unhealthy in winter-time by wet, it is to no purpose to say, the ground will lie too smooth and cold, if smoothed by rolling, the present distemper is to be consulted, and the ground, as soon as dry enough, ought to be rolled.

§. 17. As wheat should not be rolled too early in the spring, lest the frosts should hollow it again, so it Best season of rolling wheat in the spring. ought

ought to be done soon enough to give it the advantage of tilling; for doubtless the sinking the roots of the wheat deeper into the earth by rolling, and the closing the earth to the mores and knees of the winter or autumn-tillows makes them tillow afresh, and if rolled by about the eighth or middle of March, that will, as I suppose, be the best season for rolling in the spring; nevertheless wheat may be in that unthriving condition, that it may be necessary to roll it sooner.

Of rolling
barley.

§. 18. The first week in May (anno 1703) I sowed rath-ripe barley, and on the first of June I saw the barley falling off, and declining; the ground was very hollow, and as I thought needed rolling again; so I ordered it to be rolled where it was lightest, as on the head-lands, &c. — The barley had a good stem, and in going up the hill, the horses being forced to strain on their hoof's points in many places actually cut off the barley at the stem, inso-much that I could in some places take up handfulls; but examining it, and opening the valves, I found nothing but leaves rolled together, and that the ear of the barley was seated lower, and not yet shot above ground; however I staked down a stick or two in the places that suffered most, to see how the ears there proved. — In the evening of the next day walking in the ground I observed the barley to look much refreshed, and to be greatly improved in colour, which seemed strange in so short a time; but what wonder if a plant revives in twenty-four hours, when, being gathered, it languishes in one. The considerable benefit it received was by compressing the ground, which by it's spunginess had taken a great deal of wet, but the roller, by compressing it, squeezed it from the roots of the corn. — The corn I had marked with sticks came up well also, and carried as good ears as the other.

§. 19. Oats

§. 19. Oats early sowed, if not rolled till towards the end of or after seed-time, ought, for the most part, to be rolled with the heaviest roller, for a light one will make but a small impression where the ground has been so long settled. Of rolling
oats.

§. 20. I observed the great grey partridge-peas sowed in February had very little charlock among them, tho' not rolled: it seems to me the ground ploughing heavier then, than it did in March, and the coldness of the season obstructed the germination of the charlock-feed, and by that time the spring came the ground was pretty well settled, and become too close and hard for much of the charlock-feed to push through; — but the blue peas sowed in March had abundance of charlock amongst them, especially where the ground had been dry and worked fine, to the prejudice of the peas, these peas not having been rolled neither; wherefore I conceive, that rolling of peas as soon as the ground is sown, or soon after, would bind and press it so close, as to prevent the charlock-feed from coming up, and I do therefore hold rolling to be good to prevent the growth of this, and many other sorts of weeds. — And barley and oats, which with us are rolled, do doubtless thereby much more escape being infested with weeds: — but, as the coldness of the ground in February, and the moisture, is a check to the growth of charlock, (for all moisture at that season is cold) so moisture and wet after the middle of March, and in April, is productive of charlock and other weeds, because such moisture, is then tolerable warm by the power of the sun acting on it. Rolling
checks
weeds.
Of rolling
peas.

§. 21. To roll winter-vetches when first sowed seems to me to be as proper as to roll wheat when first sowed: as before noted. Of rolling
vetches.

§. 22. In light land, where clover is sowed, if in the winter-time the great roller was drawn over it, it would fasten the ground, and make the clover hold much better and longer. Of rolling
clover.

Of CORN in GENERAL.

Opinion of
the antients
concern-
ing corn's
degenerat-
ing.

§. 1. * **C**olumella tells us, that, except we take care to change the seed, corn will degenerate much sooner in a wet soil than a dry one, and, after a third crop, wheat will become what he calls a *filigo*, a sort of corn fair in colour, but poor in substance. Palladius speaks to the same purpose.

Of many
ears on
one stalk.

§. 2. Evelyn, as before hinted, reports that diverse ears may grow on one stalk, which is what I have never observed, except in Pharaoh's dream, (Gen. xli. 5.) where we read of seven ears of corn that came upon one stalk.

* stem or
stalk is sup-
posed to be
meant, or
else there is
nothing re-
markable
in it.

Heylin, lib. 2. fo. 133.—says, in Rezan, a great and goodly province in Russia, situated between the river Tanais and the river Occa, the most fruitful country of all Russia, and (if report be true) of the whole world, it is credibly affirmed, that one * grain of corn brings forth six ears, the stalks whereof stand so thick that a horse may pass through, or a quail fly out of them, but with very much difficulty. This author also gives instances of the vast fruitfulness of Padolia in Poland, fo. 144.

Mr. Bobart of the Physic-garden at Oxford told me, he had in his herbal a barley-culm with three fair ears thereon, but the two outermost were shorter than the other; he inscribed or under-wrote this plant Thus; — *Hordeum spica multiplici*,

Found plentifully growing near

Sutton by Cranborn in Dorsetshire,

By Mr. Crop of Christ's-church-college, an. 1697.

* *Celerius locis humidis quam siccis frumenta degenerant, nisi cura adhibeatur renovare semen. Columella, lib. 8: f. 102.—Nam omne triticum solo uliginoso post tertiam sationem convertitur in filiginem. Columella, lib. 8. fo. 102.—Locis humidis semina citius quam siccis degenerant. Palladius, lib. 1. sect. 6.—Et infra dicit, omne triticum in solo uliginoso, post tertiam sationem in genus filiginis commutatur.*

Concerning

Concerning the above field of corn Mr. Bobart said, the story was, that a charitable woman in time of great scarcity had relieved the poor, and God gave this return.—The same day I saw doctor Frampton of the abovesaid county, who told me, he had never seen the field, nor any such ears of corn; but had heard of the thing, and the story.—However I give not much credit either to the fact, or the cause.—Mr. Bobart also assured me, he had once seen a wheat-stalk with two ears on it. Some time after this I sent him a spike or an ear of smooth-crested-grass, which divided itself in this manner , so that there were two compleat ears nearly on one stalk. Refer this to Mr. Evelyn's prodigy of wheat.

§. 3. Mr. Ray, in his Prolegomenon to his first volume of plants, quotes the opinions of several authors, that barley ears have here and there carried grains of oats, and other grains of different corn from it's species; but they, who made such observations, it seems, were bookish men, who were misled by the appearance to their eyes, and unacquainted with what is commonly observed in husbandry; it being true, that, in wet years, when barley runs thin, it is common for a grain, here and there in a barley ear, to have a deep crese along it, and to be as thin as an oat, and to resemble an oat very much, but in truth, if unrinded, has no oat-hull, but a barley rind on it; and doubtless, in case such oat they pretend to grow on the barley ear was sowed, it would produce a true barley ear.

Of barley
bringing
grain of a
different
species.

§. 4. In the hot countries, where little rain falls, the dews fall in vast quantities, on which the herb of the field has great dependence for being watered; this was reckoned in those parts amongst the greatest blessings in the gift of the Almighty, and so Isaac blesses Jacob (Gen. xxvii. 28 and 29) God give thee of the dew of heaven, and

Benefit of
great dews
in hot
countries.

Mr.

Mr. Garret who lived many years at Madrid assures me, their crops of corn in Spain are much thicker set than ours, and yet their ground is very light, at which I wondered, their country being hot.—He replied, they sowed very early, before the sun grew hot, and that the dews were very great.

Late sowed
corn will
not seed
well after
dry springs
in the hill-
country.

§. 5. This year (1707) the spring proving very dry till June 13th convinced me, that not only peas, but all sorts of corn also late sowed for seed will not seed well; for in our hill-country the oats and barley, &c. tho' sowed early, yet not growing till the abovesaid rain fell, had all short ears; the sort of land could not bring on the corn fast enough, tho' the summer all-along afterwards had plenty of rain.—In very rich lands, it is likely this year the same defect was not observed.

Wheat will
not tillow
well in wet
cold
springs.

§. 6. It seems to me, and was apparent this cold wet spring (1708) that, if the month of April be wet and cold, the wheat will not tillow, or multiply it's issues, but the winter-spindle or shoot will run up; for that winter-stalk being hardened will keep growing, whereas, to form collateral buds, which are tender, warmer weather is required, not too quick growing weather by means of hot gloomy rains, but mild and mellow weather; for, when the flush of sap is impetuous by gloomy heat, it rises so fast upwards into the first maiden-stalk, that in it's hurry it stops not enough to fling out side-branches; as in the small pox, if in the first symptoms the patient's blood be high inflamed and feverish, it hurries the morbid matter so furiously along the veins, that (unless by bleeding it be qualified) it is so carried on in a torrent as not to have leisure to kick out the pustules and the distemper; so then a hot wet season or a cold wet one are both unkindly for great crops of corn.

No country
too hot
where the
land is
fertile.

§. 7. The great fertility of Ægypt shews no country can be too hot where the land is very fertile;

tile; for our clays and mixed earths, that want the impregnating heat of the sun, are often burnt up; but their lands are so rich, that if there is but the least moisture at the bottom of the full, when they sow, their corn will be brought up in twenty-four hours time by vertue of that moisture, before it can be dried up, at which instant it strikes it's roots into the moister earth, as before mentioned in corn sown in sand;—whereas in our country, where corn requires a week or ten days time to strike root in, the moisture may be dried up before the grain can be impregnated, and so, if rain comes not, it often lies two, three, or four months without striking root, as it did this dry summer anno 1705 — and began but to grow just before harvest. If corn once grows, we see it is not easily check'd by drought in good land: in the hot countries they have great dews.

§. 8. By the effects of this very dry spring and hot summer (anno 1714) from March to July the 23d, when we had a day's rain that went to the roots of the corn, I am sensible that winter-corn, as wheat and vetches, do bear up much better against the mischiefs by drought than the spring-corn, as peas, barley, and oats, the former being well established at the roots, during the winter, and the ground better settled to them.

Winter-corn bears drought better than spring-corn.

§. 9. Being in the north (anno 1706) I had a mind more thoroughly to be informed what was most prejudicial to their lenten crop; so I asked an excellent husbandman in Leicestershire when rain fell most unseasonably on their summer-corn; he said, in May; if it proved a wet May they had always a bad crop of barley; for rain then, either killed it, or starved it, and made it look yellow. — I asked him what reason he could give for it; he said, about the beginning of May was commonly the time that their barley took it's weaning, that is, said he, when the leaves of the barley begin to die, having till that time

May, a critical time for the lenten crop in the north of England.

time been for the most part nourished by the milk and flour of the corn : but then it begins to put forth new roots, and new leaves, and to betake itself wholly to it's roots for nourishment : though the weather should prove never so good, at this crisis it receives a stop and check, like a child taken from nurse, with whom it goes much harder if the nights are cold and long ; so, if wet and rainy weather comes then, the barley will be so dashed, that it will never recover it, let what warm weather soever come after ; for, said he, after such rains, the sun having baked the top of the ground does thereby so bind it, that the heat cannot penetrate to the roots of the corn, which by that means lie all the summer in a cold bed ; — but a cold and dry May, said he, I never knew to hurt us, but rather do us good : — according as the spring proves forwarder or backwarder, so does this crisis of the corn's taking it's weaning come earlier or later, but generally about the beginning of May, unless the spring be very warm ; but a wet May used not to hurt their wheat excepting that it made it weedy ; for, said he, if we have a good season to sow our wheat in, that seldom misses. — Mr. Clerk said afterwards, their having a season to lay their barley into the ground dry, and having a dry bottom the depth of the full, for it to take root in, was of great consequence towards a good crop.

Corn does
not spindle
well in hot
countries.

§. 10. Lord Bacon in his Natural history says, that in the hot countries it is a frequent calamity, that the corn will not spindle, that is, will not come out of the hofe, by reason of the great heat and drought ; and he is of opinion, that on this account the latin word *calamitas* was derived from *calamus*.--- But I rather believe it also signifies any other misfortune belonging to corn. Pliny and Columella, speaking of blights and smuts, say, *Hordeum omnium*

nium granorum minime calamitosum;—but not spindling is a defect we seldom find in England.

§. 11. From constant experience of successive years I find, that wet years make the straw of all corn weak, small, and thin, insomuch that it is apt to lodge and crumble down, which in the country we call being knee-bent; on the other hand in dry hot summers all straw is thick and strong.—The straw in wet years runs the coarser, and that in dry hot years the finer, and then it has the more spirit in it; which is the reason why in hotter countries than England the cattle eat straw so much better than with us, and almost as well as hay.—As cold wet seasons make the straw run coarse, so cold wet land has the same effect; therefore, when both these causes concur and contribute their force, the straw will run very weak, thin, and coarse; as particularly this year (1717) the rath-ripe barley did at Crux-Easton, where the land is cold and wet, as was the year—, and rain more than usual falling on the barley, about a month before harvest, lent a helping hand to the beating it down; so that the barley-straw in a manner broke off a little below the ear, and before the grain was full plimmed or hardened, from which time all communication of nourishment stopt, and the corn rather shrank in than ripened, and consequently the barley as well as the straw in our cold lands ran very thin and coarse.—However I esteem it best on our cold lands to sow one half of the crop rath-ripe barley, because, though in such a cold year it might suffer as abovesaid in cold wet lands, yet had it not been for the rain that fell, and the winds that beat and broke it down at that nick of time, before it was hardened, it would have carried a better body than the late-ripe barley, in the same case, and on the same sort of land, would have done.—The use to be made of all this is, that tho' there is no preventing this evil, yet knowing beforehand

Cold and
wet years
occasion
coarse
weak straw

hand that in such a year your fodder-straw will be coarse, you must therefore apply it to proper uses, else it will deceive you.

The colour of corn denotes it's quality, and why.

§. 12. The colour of corn, viz. of wheat and barley, gives a great preference with the husbandman in a market, which does not a little puzzle the inquisitive gentleman, a stranger to husbandry, who hears it; but the reason for it is this; there is an uniformity between the colour of corn and it's weight, and the latter never fails to be accompanied with the former quality; — which therefore denotes it's goodness. Wheat weighs light, because it has not come to it's full maturity, and so has not sufficiently discharged the watery parts, which proceed chiefly from the coldness of the ground, that wanted spirit to carry the grain to a full perfection of ripeness; and the defect of colour may be occasioned by too much rain, which fogged the grain in harvest, whilst standing, or in gripp; for being often wet and dried again, every time it was dried, after being wet and full ripe, the moisture exhaled by the sun's drying it carried also away a tincture of, or the particles of it's colour along with the exhalation of the watery parts, and so consequently the grain must be more porous, less solid, and of course lighter: the same argument will hold for barley.

All corn is apt to grow brighter as it grows towards earing, but that, which then most holds the deep green colour, is likeliest afterwards to have the largest and boldest ears, and to bring the grain best to perfection.

Damage to green corn by dry weather near earing time.

§. 13. It was a very dry burning time (anno 1702) from the first sowing of lanten corn to the 3d of June, at which time some of my neighbouring farmers were praying for rain: why, said I, you must be in a better condition than I am; I have not seen your corn, but I know your's was sown ten days before

fore mine, and consequently must better cover the ground, and keep it cool. That might be, said they, but in another respect, because our's was sowed earliest, it may be the worse; in about a fortnight our's will be at the time for getting out of the hood, which it will not be able to do except rain come.

§ 14. I observe the white straw-wheat brings ^{Of the} white blossoms, as the red straw-wheat does red ones, ^{blossom.} and I suppose it is the same with the white oat.

§ 15. The latin writers *De re agraria* observe, ^{Prejudice} that rainy weather prejudices all sorts of corn at the ^{from rain} blooming-time, except the leguminous sort; the ^{at bloom-} reason of which, as I suppose, is, because the wet ^{ing time,} falls into the husk of wheat, barley, and oats, which ^{and why.} at that time opens, and so is corrupted by the wet standing on it, whereas in the leguminous grain the pod lies within the leafy flower, into which the wet cannot enter.

§ 16. The whiter wheat, barley, and white oats, ^{Sign of} or the hoods of black oats look as they ripen, and ^{good corn} when they are ripe, the better the corn; and ^{when} the contrary, the coarser, or more blighted. ^{growing.}

§ 17. The disadvantage that late ripe corn lies ^{The disad-} under in point of coarseness may be collected from ^{vantage} the late ripe nuts hanging on the trees, in the begin- ^{that late} ning of September, or at least at Michaelmas, espe- ^{ripe corn} cially, if rain should fall about that time, for not- ^{lies under.} withstanding the kirkel of the nut is secured by a shell, yet, at that season of the year, the cold damp air, the dews, and rain penetrate the shells of nuts, whereby the kirkels change their colour, become waterish, and in a manner tasteless; and doubtless the same evil falls on the late ripe corn.

§ 18. When September is come, say our hill- ^{Of frost's} country farmers, there are frosty nights, and then ^{ripening} the corn ripens as fast by night as by day; they al- ^{corn.} ways found it so at Easton.

But,

But, notwithstanding this observation, with which our farmers comfort themselves, that in the frosty nights, at the beginning of September, the corn ripens as fast by night as by day, yet willingly I would not have corn to be so ripened, for in truth such ripening may be more properly called blighting; inasmuch as ripening implies filling the grain, and somewhat leading to it's perfection; but these frosty nights rather shrink, and dry up the grain, and stop it's filling and plimming: in like manner all sorts of fruit may be said to be ripened by the frosts, inasmuch as they precipitate to a rottenness, &c. And my opinion is, that such blighted or frost-bitten barley, not arrived to it's natural ripeness, can never have a goodness in it's flour like other corn that is ripened thoroughly, nor be so profitable for malting; it may possibly be as big as kindly ripened corn.

Wheat and
barley thin
in a late
harvest.

§. 19. If harvest proves late, as in the latter end of August, wheat and barley, that is then to fill, must run thin, and the same is true of all sorts of grain, and in a wet summer the vale-corn, which usually runs to halm, will keep the ground cold, and prevent the filling of the grains.

A late
harvest no
hurrying
harvest.

§. 20. A late harvest is seldom, as I believe, a hurrying harvest; because, though in such case there is reason to make all haste possible, yet the coolness of the days, and the long dewy nights, will not let the corn ripen altogether, nor make it shed or britt, as the early harvests cause it to do, all which I have experienced this year 1703.

Of cover-
ing corn
in carrying
to market.

§. 21. Barley, in carrying to market, say our farmers, need not be covered, rain it never so hard, but wheat is thought the worse for rain.

Why rank
corn brings
a thin
grain.

§. 22. Mr. Ray conjectures, that the reason why the grain is generally thin, when corn grows very rank and thick in straw, is, not only because it's strength is exhausted in the grossness of the blade,

but

but, says he, that grossness of the blade may hinder it from the cherishing rays of the sun, which are necessary to concoct the nutritious juices, and to convey them into the seed, and he gives an instance of our sowing English corn in America. Hist. of Plants, vol. 2. fo. 1238.

§. 23. Since (as by former remarks does appear) the wheat-ear is worse for it's straw being broken, and for the sun's not coming to it's root, it follows that, where vetches run so rank as to finnow in their halm, the straw and the juices conveyed through it must be so prejudiced as to carry a thin grain.

Thin-grained
vetches
from finnowy
halm.

§. 24. Anno 1707 the winter proved exceeding wet, and the spring and summer were the same, in-
somuch that the harvest was very backward, and it was the middle of August before we began to cut wheat: the consequence of these wet seasons, as I conceive, was, that the wheat in cold clay-lands blighted, of which I made a general observation: the reason I take to be, because, these three seasons proving wet, the harvest was backward and late; and the rain being frequent till harvest, the vegetable juices, especially in clay-lands, were heavy and chilled, and could not rise to nourish the grain and the straw; for which reason, both being starved, the straw turned white and speckled, and the grain shrank, and, as I observed, in such lands the straw of red-straw wheat did not that year look red, but from it's green colour turned to white, but in white or warm land the wheat escaped blighting, because there the vegetable particles were attenuated enough to ascend.

Why wet
seasons
bring
blighted
corn.

Tho' the wheat was so much blighted in the year 1707, yet barley and oats this year did not blight, but were full-grained, whether, because they had not been pinched by the winter, not being then sown, or from their lying on a mellowed mold and hol-

lower from being later ploughed, whereby the sun might inject his comfortable rays the better, I know not.—We find no summer too hot for wheat, tho' it may for barley and oats.

Cause of
the ustilago or
burnt-ear.

§. 25. Of the cause of ustilago or the burnt-ear in corn Mr. Ray gives his conjecture, fol. 1241 and 1242;—But my opinion is that it proceeds from a defect in the root, but then that defect must be attributed to ill seed, with a distinction that makes no difference in the effect: the seed might be damaged before it was sown, or the nature of the ground might occasion the defect; for what difference is there between corn originally bad and that damaged by keeping, or taking damage in the field, before it could come up, by being almost malted, or otherwise injured in the ground by it's ill temper or unseasonable seed-time? What happened very observable to clear this matter was, in the spring-seed-time 1704 I sowed very good seed-barley in all my grounds; therefore no fault in my seed; so did many other farmers; I could find little ustilago in my oats; they being sowed early their seed came up, and lay not in the ground to take the damage abovementioned, and the oats which were sowed early, on which rain came, had not the ustilago, nor the barley sowed early, except some little matter occasioned by their being sowed in white lands, but the middle sowing, when the ground had not moisture enough to bring up the corn, nor had had any rain fall on it for a long time, was injured in it's seed, and turned mightily to the ustilago all over the country, but the latter sowing, after which rain came, had little of it: hence may appear the great benefit of rolling. The ustilago is common to the ears of grass as well as of corn, in which I have frequently observed it, especially in the *gramen cahirum nodosum avenacea paniculâ*, or knotty-rooted dog's-grass.

In

In June however (1705) I gathered diverse ears of black-burnt wheat, all burnt to a black powder; I also gathered several of the strong and good ears; I found the straw of the burnt ears drew with as much difficulty out of the ground as the best, and had, to my eye, as good mores; I cut every joint of the reeds in many places, both of the sound and burnt-eared straw, and found them to my eye, equally sound, and as much verdure and firmness in the stems that bore the burnt grains as in the others, and many of the ears I found so burnt before they came out of the hoods; so that I am again at a loss to conjecture what the cause should be. By the bigness of burnt grains it should seem, that this misfortune fell on the ear, when it was of pretty tolerable length, and yet before it was half grown in the husk; for it is most certain that these grains could not grow after they were burnt. See farther of the causes of smut and blight under the article Wheat, §. 10. See also Barley, §. 24.

W H E A T.

§. 1. **A** Wheaten crop is the most unprofitable of any to a farmer by reason of the charges,—and because a farmer sees not a return of that usually under a year and an half.

§. 2. It is commonly said, that ground, which has got a sword, is best for wheat, — and therefore farmers are apt to say, that land, which is not inclinable to grass, is not fit to be sowed with wheat, till it has got a sword, — whereas the less sword any ground has the fitter it is for any sort of corn, except it be white ground that wants a sword to hold it together.—But a sword on ground is an argument that it has lain lay the longer, and lying out of tillage makes all ground the better: I know no other way of solving the abovesaid observation of the farmers.

Q 2

§. 3. This

Of the hardiness of wheat.

§. 3. This year, 1717, we had no rain from about the middle of March to the 22d of May, (unless a moderate shower on the 7th of May, and some small thunder-showers, of which last our neighbourhood had no share) and yet my twenty acres of wheat on a side-long white-earth-ground of about six-pence per acre, and six acres more of wheat on the like sort of ground, did thrive something all the while, and lost not much of it's colour, which shews how hardy a grain wheat is: during the aforesaid time we had also for the most part very dry husky winds, hot sun by day, and frost by night: it is true we had an exceeding wet winter, which might beat the white ground the closer.

In cold dry springs and hot dry summers there is a great difference between the wheat and barley harvests ripening; for this year 1714, was such as abovementioned, when I began wheat-harvest July the 20th, and ended August the 5th, — but did not begin to cut barley till August the 16th, and in a lingering manner ended the 30th. The reason was because wheat, being a hardier grain, was not checked by cold, nor heat, nor drought, it's roots being well established and the ground well settled to them; but barley, being a tender grain, was pinched and retarded by the cold; the ground being late ploughed in the spring lay hollower and lighter, and consequently more susceptible of heat and cold.

Of it's tillowing.

§. 4. It is not easy to be convinced, if ground be in good heart, though wheat may look very thin all the winter, and till May, how strangely it will tillow and fill up, if not hindered by weeds: this I have often observed in my wheat.

Different kinds of wheat.

§. 5. ^a The Bluebury wheat is the red straw-lammas, not the white straw-lammas: there is another

^a Mr. Miller reckons up thirteen characters of wheat, viz. 1. White or red wheat without awns. — 2. Red wheat, in some places

ther sort of wheat they call the white white, because the ear and grain is still whiter than the white-lammias. — Then there is the bearded or Poland-wheat, which has a stiffer and stronger stalk, and is therefore often sown in wet cold clay-lands about Wiltshire, because the stalk bears the wet better without rotting or lodging. These are the chief sorts I have any experience in.

§. 6. Mr. Raymond assures me that he finds red-straw wheat, if sown at the same time with any other wheat, will be ripe a fortnight sooner. Note

Of red-straw wheat,

— All precociousness in the same species implies a looseness of texture, and weakness in parts: I noted before that the red-straw wheat and rath-ripe barley were apt to fall and be knee-bent, and therefore the one was often sowed, in deep lands that were apt to run rank, with great wheat, the other with battle-door barley to support them, these being stronger in stalk.

§. 7. Mr. Ray tells us of a certain Thracian wheat, which they sow there in the summer, to avoid the cold; this wheat, says he, is sowed on light ground, and never has but one culm or stalk; it ripens in three months. What is more remarkable of it is, that it does not yield to any other wheat in weight, and has no bran. He thinks however, that this wheat is not of a different sort from the common wheat there, but that it alters its nature, and grows tenderer by being sown in the spring, which is a property worth noting.

Of Thracian wheat.

places called Kentish wheat. — 3. White wheat. — 4. Red-eared bearded wheat. — 5. Cone wheat. — 6. Grey wheat, and in some places duckbill wheat, and grey pollard. — 7. Polonian wheat. — 8. Many-eared-wheat. — 9. Summer wheat. — 10. Naked barley, or *triticum spica hordei*. — 11. Six-rowed wheat. — 12. Long-grained wheat. — 13. White-eared wheat. But some of these, he says, he takes to be only seminal variations, and not distinct species.

Branch-
wheat.

§. 8. I saw some branch-wheat, so called, because the ear is branched into smaller ears issuing out of the main ear : of this I have no experience ; and can only say that a gentleman, who is well acquainted with it's properties, tells me it makes the best frumenty that is, and the best pudding, and casts as yellow a colour without eggs as other wheat does with eggs.

Of smut.
Smut produced from
poor
ground
sowed with
large-
grained
wheat.

§. 9. Discoursing with farmer Bachelour of Litchfield about the best choice of seed-wheat ; he said, he loved generally to choose a middle brownish sort of grain, not the largest bright and smooth fat corn.—I asked him why he was against a large fair grain ; he said, because he observed such grain was apt to carry a smut. — If this be true, as probably it may, I know of no reason to be given for it, except that Litchfield-farm being generally a poor soil, and lying pretty cold, cannot maintain and feed the root, stalk, and ear of such fat seed, so well as it can those of the small grain, and so the ear of the large-grained wheat mortifies and corrupts in the sap, for want of nourishment, before it comes to be flour, which is the time for wheat to take smut. — It is manifest from many experiments I have made, that the number of the roots, the breadth of the leaves, and the length of the ears, carry a proportion to the size of the grain, but poor ground cannot maintain it, and so produces a smaller root, leaf, and ear than such seed would naturally put forth, all which impairs the stamina of the increase, whereby the ear is depraved, and liable to smut ; but where (as at Crux-Easton) ground is strong clay, tho' very cold, this objection may not hold good.

Another farmer told me, he looked on the small-grained wheat to be better seed-wheat than the great yellow wheat ; for, said he, the latter sort is apter to smut ; besides a bushel of the smaller grain contains so many grains the more, which is a great matter :

ter : he added however, that the smaller the grain the earlier it ought to be sowed ; because, if winter came on upon it, that might prevent it's shooting so many blades, as otherwise it might have done. I soon after consulted two other very knowing farmers about this matter : they were of a different opinion, and said, the bigger the seed was, of either wheat or barley, it would give the greater root more, and have more blades.

§. 10. I looked into Mr. Wilson's smutty and blighted wheat, in order to discover what might be the cause of smut and blight. The smutty ears are perfect in the chests, and almost so in the fulness of the grain, even so far that the chests of many ears did strut ; so that the smut must fall on the grain late, and when it is towards a fulness, for it cannot grow after it has taken smut. I could very rarely find a smutty ear but all it's tillows were so too ; so that from thence I conclude the smut arises from the root, and not from any poison in the air, which would not distinguish between the tap-root and the tillow. I also observed in the fibres of the roots of the smutty wheat, a general brittleness, and the earth more starchy and dry about them, and I perceived, for the most part, a stream or streak of a brown stain, the breadth of a pin, in the first joint above the root. So that I am apt to believe that a smut arises from a total defect of sap at the root, and a blight from a partial one, when some of the fibres may still live ; so the grain, being feebly supported, does only shrink or wither.—As for the early smut that falls on the ear, even before it is out of it's hose, wherein the covering or chaff is also smutty, and all in a light powder, this sort of smut seems to arise from the same cause as the former, only the ear having not as then obtained a firmness, it's rottenness becomes more hollow and powdery, and of less consistency than the smutty ears that have obtained

Of the
cause of
smut.

a firmness. On the whole therefore, notwithstanding the latter part of my remark, §. 25, under the article Corn in general, where I say I could not discover any difference between the roots, stems, or joints of the stems of the burnt-eared wheat and the sound, I am still of opinion that both the ustilago and smut proceed from a defect in the root.

Some farmers were saying, that dunged land, as had been always observed, was more subject to smutty wheat than folded land. If so, the reason must be, because the dung hollowed the ground, and therefore the longer the dung the greater the danger.

I have in another place observed, that smutty dust on feed-wheat may produce smutty wheat, and no wonder, seeing the seed immediately after sown swells and imbibes the smut with the moisture, and the nib or chissum of the seed is corrupted and poisoned thereby. The nib of the seed is not one fourth part so big as a pin's head.---Seed blacked with ustilago does not hurt like smut, because the hot burning quality of the ustilago is washed out of it by the rain, and purified from it by the air, to both which it is exposed.

Of sowing
thin blighted
wheat.

§. 11. I sowed new wheat, but observing much of it to be withered, and blighted, I shewed it to some of the farmers, and they, but particularly farmer Biggs^b, said, it was never the worse for that, and it would grow as well as if it were otherwise, and bid me put some into the ground to try whether his words were true or not.—I asked Thomas Elton about it, and he said, if it were not blighted and withered to a skin, but only so as to have very little flour, he also thought it would grow; but then, said he, I have known it to die away afterwards.—I asked him, how he knew it was that wheat, and how he knew it was for that cause it died; he replied, because he had in such case scratched up the root, and found that there was not flour or milk sufficient to maintain the blade till it could take root.

^b Mr. Tull is of the same opinion with farmer Biggs.

I met farmer White and farmer Bachelour of Litchfield in the market ; I told farmer White how thin his seed-wheat proved that he sent me, and that it was exceedingly blighted ; and that I was satisfied, let the farmers pretend what they will, that blighted wheat, if I sowed late in the year, tho' it might come to a blade, yet the flour or milk that ought to maintain it would be spent before it could * more ; and then, if frosts came, it would be in ^{root,} danger of dying.—They agreed with me, that, in case it was late sowed, it was their opinion also, but it would do well if sowed early ;—but, said farmer Lake an hour afterwards, when I was speaking to him of it, let it be sowed early or late, give me a full-bodied wheat.

§. 12. Many farmers, and indeed all I have talked with on the subject, agree that musty wheat, though not grown out, will not grow.—I suppose it is because the seminal part is malted, tho' it does not outwardly shew itself, as it does when it is grown out. ^{Musty wheat will not grow, and why.}

§. 13. Farmer Biggs says, he always sows the Bluebury wheat, that is the rath-ripe wheat.—The meal-men do not like the white-lammas wheat ; they say, it does not cast so fine a flour. — Thomas Elton also says, they seldom sow of the white-lammas wheat, — and both he, and farmer Biggs say, the mealmen know it from the other better than they do who sow it.---Thomas Elton says, he has been at Reading with it, and could not have so much by twelve shillings in a load as for the Bluebury wheat, tho' of the same goodness.---I asked him, if they did not observe to sow the white-lammas wheat earliest, because of it's being last ripe ;---he replied, he found no difference in that, but that it was ripe as soon as the other to the full. ^{Rath-ripe wheat preferred to white lammas wheat by the meal-men,}

§. 14. ° The original of brining and liming seed- ^{Brining and liming wheat.} wheat

° Mr. Tull observes, that brining, and changing the seed, are the general remedies for smut ; the former of these he has heard was

wheat seems to be purely an English practice ; for which there is a story.—Neither the *Rei rustica scriptores*, nor Pliny, take any notice of it.

Sharrock says, brining and liming wheat may defend it against grubs, insects, and worms, and fortify the grain, but he cannot think it any security against blights, &c. See fo. 99.

I had wheat brined and limed for sowing, but much rain coming, and the ground being wet, I could not sow it for a fortnight ; at the fortnight's end I had sundry people with me about measuring harvest-work, so I asked their opinion whether such wheat would grow or not ;—one said, he had known wheat that had not been brined and limed above a week, and a great deal of it did not grow.—Another said, it depended on the high degree to which it was limed, for, if it was so high limed that it shrunk and shriveled, it would not grow, but, in case the rind looked plump and smooth, then there was no danger. A third was of opinion, that there was a great difference in the manner of brining it, for, if the wheat had been steeped in brine, it would be much apter to burn by lying in lime than it would having been only sprinkled with brine in the morning it was limed.—Note, this brined wheat was

was discovered about seventy years before he wrote, by some wheat being sown, that had been sunk in the sea, and which produced clean corn, when it was a remarkable year for smut all over England ; but he afterwards doubts whether this might not happen by it's being foreign seed, and therefore a proper change for our land. He tells us of two farmers, whose lands lay intermixed, who used the same seed between them, and from a good change of land, and asserts, that the one, who brined his seed, had no smut, but the other, who neglected it, had a very smutty crop ; but again he doubts whether this seed might have been changed the precedent year, and so might not be greatly infected, no more than what the brine and lime might cure. He adds also, that smutty seed-wheat, tho' brined, will produce a smutty crop, unless the year prove very favourable ; for favourable years will cure the smut, as unkind ones will cause it.

not

not sowed till November 7th, which was seven weeks after it was limed, and yet it grew, and came up so thick that it seemed to have received no prejudice.

§. 15. It was universally observed this last winter, (anno 1708) that the wheat which was killed was not killed by frosts, tho' they were very intense, but by the winds, which drove the frosty particles in such a manner as to penetrate into the roots of the corn; this may be supposed to be effected with their angles, which lanced the fibres and cut them in pieces, like as fire by it's subtle corpuscles in it's rapid motion may be supposed to penetrate and divide bodies. — It was plain the wheat on our hills in Hampshire and our high grounds, was cannonaded, for the driven snow, as it was carried to the hedges by the wind, battered the wheat and cut off the blade, and the wounds it made opened portals for the fierceness of the weather to enter the roots. — Wherever the wheat lay out of or sheltered from the wind, in those places it was saved; and the furrows of grounds, where by lying wet (and this was a wet winter) the wheat is always worst, were, if the ridges cross the wind, the best, because the ridges sheltered the furrows, but, if the ridges and furrows lay parallel to the north, or north-easterly wind, then the wheat in the furrows was also destroyed, but wheat lying under the shelter of hedges was saved. — From the sad experience of this year we may in our hill-countries conclude it to be good husbandry, to have a special regard, in the sowing of wheat-lands that lie exposed to the north or easterly winds (for it cannot be supposed any danger can come from the south or west quarter) first, to sow under furrow, or at least a cast over and a cast under, that thereby the wheat may lie the deeper both from the penetrating power of the winds and from their power of uncovering the earth, and laying the roots of the corn naked; Caution—
to sow
wheat un-
der furrow
in the hill-
country;
not to har-
row too
fine; nor
to cut hed-
ges too ear-
ly for fear
of the cold
winds.

naked ; secondly, to leave our grounds a little rough, and not harrow them too fine, it being observed that the wheat saved itself much better when the knobby clods sheltered it ;---thirdly, to have a regard, where grounds lie bleakly exposed to those winds, not to cut down the high hedges, which may be a fence to it, before February.

Observation
on the
growth of
wheat.

§. 16. The 20th of November, (anno 1704) I observed the wheat on the ground, and that the first, or capital branch, consisted of an upright spire, between two leaves falling on the ground ; but the issues or tillows, be they never so many, had but one leaf on one side of the spire, by which the issues are to be discerned from the main branch ; and in both good and poor wheat the difference was the same. --- I know not therefore what the Latins meant, when they said, wheat must not be raked till it has four leaves, nor barley till it has five.----The same day I observed the tillows of rye-grass, and found that both the capital germen and the tillows do consist of but one spire issuing from the middle of two grass leaves, and therefore different from that of wheat.

Observation
on the
ears and
roots of
wheat, and
inference to
fow little
land and
good.

§. 17. It was the 23d and the 24th of June (anno 1703) I made the following observations with relation to the ears of wheat : in one field there were, for two acres together, generally in an ear ten chests on a side ; about four of the middle chests on each side contained five grains, viz. two on each side the middle grain ; but the uppermost and lowermost chests fell off gradually to four, three, and two grains in a chest. --- I went into another field, and could not find above eight or nine chests in any ear there, nor in any of the middle chests above three grains, viz. one on each side the upright middle one ; and so again the uppermost and lowermost chests fell away gradually into two, and but one grain in a chest ; yet this land had been well dunged.---In
another

another field it was manifest, that part that was dunged carried not so long an ear, nor so many grains in a chest, as that part of it that was folded, and sowed on one earth; but there were many of the ears of the folded wheat that held out ten chests, and had five grains on each side in the two middle chests: how these ears might prove I knew not, very little of the wheat being blown. — I also observed the partitions of the chests to open, in order to let out the blossoms; which when shot out, they closed again, and the blossom hung dangling on the outside by a hair as fine as a cobweb: till I made this discovery of the chests opening, I used to wonder how so fine a thread could thrust out the blossom.--- Then in another field I observed the limed wheat to be of a most vivid scarlet in the colour of it's blossom, more lively than the flower of that in the first mentioned field, which was a more dusky scarlet; yet it exceeded the flower of my other pieces of wheat, which generally did not come up to the colour of that, having a more wan and sickly scarlet coloured blossom. — I also pulled up several roots of wheat, some of which had ten tillows; for I washed their roots, and found them all joined in one.

Now, if some roots of wheat have ten tillows, others but two or three; if some ears of wheat have ten chests of a side, others but six or seven;— and some ears have five grains in the best chest, others but three, and two, I leave it to be considered what encouragement there is to sow little land and good. —The ten-chested ears at four middle-chests each side, with five grains a piece, make forty grains; the twelve other chests, at three grains in a chest, make thirty-six. ——— The weak wheat has but twenty-six grains in an ear, and six tillows less, and it's two tillows must also hold but in proportion to the top ears.

Of the
ears of
wheat on
land shaded
from
the sun.

§. 18. I went under a hedge, where my wheat was almost as high as my head in the head-land, the reeds very strong, the chests ten or eleven on a side; yet I observed the blossoms generally to be very pale and sickly, of the colour of ashes on a dying coal, and I seldom found above three grains in a middle-chest: these defects I impute to the head-land being shaded from the sun; for by the length of the reed, the many chests, and by my own knowledge of the ground, it was very strong; but doubtless those grains must run very thin at harvest.

Farther
observation
on the ears
of wheat,
and why
nature fur-
nishes more
chefts than
the can fill.

§. 19. July 6th (anno 1703) I viewed a field of wheat, the blossom being just over; I plucked some of the chests, and found, tho' provision had been made for three or four grains in a chest, yet in many of them there were not like to be above two or three grains, and I found in those failing grains their blossoms pent up and withered, the grains not having strength to emit: — and in those ears, that had the withered grains, I found the outmost grains in the chest on each side to be best maintained, nature having deserted the others, not being able to maintain them.

Whereas I had observed in the flowering of the wheat, that, the ears being large and the chests broad, there were in the middle chest of the ear five grains that had flowered, which I apprehend to be the full complement in the middle chest of an ear; examining these ears and chests about a fortnight or three weeks after, I could in none of the middle-chests find above three grains of wheat, in many but two.

—— If you ask, where was the advantage of these ears producing so many cells, when but two or three grains, or cells in a chest came to maturity? I answer, the advantage was very great; for in the first place they are a sign of the fruitfulness of the root, and, if two cells do decay, the other three will be the better maintained, and have the fuller grain.

Secondly,

—Secondly, where in the wheat flowering-time there are the more cells in a cheft that bloſſom, they can the better maintain the loſs by all accidents that may happen; for inſtance; if one or two grains in a cheft fail at flowering-time by a flyblow (it being often the caſe) there are bloſſoms enough in the cheft to make good that loſs by maintaining three good grains in a cheft; whereas in ears that are weak, and produce but two or three bloſſoms in a cheft, if thoſe bloſſoms ſhould be blown, all muſt miſcarry. —I was apt to think however, that of the five bloſſoms produced in a cheft there could but three prove good, nature not being able to maintain more; and this I concluded, becauſe it could do no more by my wheat, which grew in general on exceeding good ground; and the cheſts were ſo conſtructed, that it ſeemed to me, there could be room for no more grains in a cheft; but on coming from Ilſly to Oxford I obſerved ſome mighty rich land, that had large-eared wheat, many of the ears containing twelve cheſts on a ſide; I am now therefore convinced, nature is not confined, as above hinted, to five bloſſoms in a cheft, for in the middle cheft of theſe ears there had been fix, if not ſeven bloſſoms, the two middlemoſt of which nature was not able to maintain, and ſo they withered, but I told in thoſe cheſts five compleat grains full-kerned.

§. 20. In viewing my wheat, when it was near full-kerned, I obſerved ſome withered ears, which in all their cheſts looked dead: the grain was ſhrunk and withered, tho' in other reſpects good, for it had a ſound flour, but the ſtraw was dead to the root, and that drew up eaſily, the fibres ſeeming dead and dry; ſo that this is a farther, and another ſort of defect in wheat than either ſmut or blight, viz. by worm, or burnt.

A defect in wheat not commonly taken notice of.

§. 21. April 14th (anno 1705) I firſt obſerved the manner of the tillowing of wheat: the ſpring-tillows,

Of the tillowing of wheat.

tillows, for the most part, do arise from the foot of the root of the winter-stems or shoots, which may be two, three, or four, according as the wheat is in proof; they arise from that foot, and, when they break out at first, they may be perceived by the eye in a bud smaller than a pin's head, containing a crystalline pellucid juice; which bud is secured by the coat of the outward leaf of the mother or winter-shoot, between which coat and the inside-coat of the winter-shoot this tender bud passes along, as through a sheath, whereby it is protected from outward injury, till it is so well grown as to break forth with its green spire; from the side of this winter-shoot now and then only one of the said spring-soboles does arise, and now and then another on the contrary side, and perhaps a third or fourth on the other sides, according as these winter or mother-shoots are in a flourishing condition, till at last they, being grown thick and strong, open the socket of the said outward leaf, which girds them close to the mother-stem, and so stand independent, wide off from it; and then that old leaf becomes useless and dies.— This day I also observed a new pearly brood of soboles at the root of the said winter-shoot, in the manner as the other before described, no bigger than a pin's head: but whether it be not now too late for them to come to maturity is a question: it is very probable warm and dry weather may very much conduce thereto.— The first and earliest soboles or tillows abovesaid, being at this time shot up into the open air in a spire, seem by their growth to have made a bud very early in the winter, which another year may perhaps give me opportunity to enquire into. From many experiments I have made, by sowing corn in pots, I find, that, when a maiden spear has been dead, no collateral spear has shot from the same basis, but that the tillows are properly offsets from the maiden stem.

§. 22. The

§. 22. The autumn (anno 1714) wanting rain, the ground, at the beginning of wheat seed-time, was but just moist enough to bring up the corn: the farmers (who kept on sowing) observed that the corn, which came up before any rain had fell, had but a thin blade, and was of a dark colour, wanting the broad leaf and golden colour they expected: it fell out the same with me in the ground I sowed under furrow, tho' the moisture was sufficient to bring up the corn thick enough.—Farmer Isles and farmer Box, my tenants in Wilts, observed the same thing in wheat they sowed at the beginning of wheat seed-time.—It's not unlikely but this drought might do no prejudice where the land is very good; for tho' the thin blade, &c. certainly shew the root and stalk to be weak, yet in rich land they might strengthen when rain came; but where ground is poor, when wheat comes up thin in blade, it is a question whether it will ever recover, and get a good root, stalk, or blade, tho' rain should come.—This narrow leaf is occasioned from the earth's not giving up the juices freely at first.

§. 23. In turning up wet wheat straw (laid together in a heap the beginning of November 1702) I found in January many loose grains speared out, but, on account of the thickness of the wadd of straw laid on them, they were not able to shoot thro': I measured their white stiff sheaths, thro' which their blades pass, and they were from four inches to five inches and an half long. Now, these grains having liberty to shoot their sheaths to their utmost extremity, according to the respective vigour of each grain, and not being hindered by the straw, I infer that those lengths are the utmost lengths their sheaths will reach to; so that, if the grain is buried below such depth, the sheath cannot protect the blade, nor give it safe convoy farther, but it must venture its own self to get thro'. I observed however a round wiry substance the blade

When wheat springs with a thin blade it seldom recovers itself in poor land.

Of the length of the sheaths of wheat grains.

carried, an inch upwards from the opening of the sheath, and before it opened into the leafy blade, which tho' less in compass, and less stiff than the sheath, yet seemed of a strength better able, than if it had been a leafy blade, to penetrate upwards, if the sheath could not carry it into the air. I infer also from the different lengths of the sheaths, that these lengths depended on the respective powers of the grain, seeing that they had the same bed of straw, and were all buried the same depth: it would be well therefore to try old grains and new, and lay them at different depths, and see what foundation it would give to farther conjectures. I observed the sheaths, which had ran out so far, were much weakened by it, and had not that stiff strength that the sheaths of common sown wheat has, which lies shallow. The grassy blade had shot forth two inches into the dunghill, but looked of a yellow sickly complexion.

Of the
knots in
wheat
straw, and
the growth
of wheat.

§ 24. In cutting many wheat reeds I observed all their lowermost joints were short, of two or three inches in length, and without hollowness, and that they gradually lengthened and hollowed; which was in reason so ordered by God, for the better strengthening the reed to support the grain. The fourth joint in all the reeds was very hollow and very moist; several drops of water came from most of them in that joint; whether it was occasioned by the very wet May and June, or not, I cannot tell. Again, from that joint the next above grew less hollow, and the uppermost, that carried the ear, had no hollowness, but a green strong hood, wonderfully contrived for strength, to support the grain. The hoods of the first joint were dead, (these I take to be the two dying leaves that begin to appear in May) so were the hoods of the second joint, that being of such strength as not to stand in need of them; but the two last and uppermost hoods seemed carefully to protect those whole joints respectively, and to strengthen

strengthen them. I also observed the tillowing ears which, tho' they were suckers from the trunk of the tall reeds, that bore the long ears; yet they had two or three small roots of their own, on which they seemed to depend. Quinteny observes, the sap shoots to the topmost branch most vigorously: so it certainly is in the wheat-ear; for, if any grains in the ear are wanting, they are the lowermost.

§. 25. Being at farmer Sartain's at Great Chavel in Wilts, I said, that one advantage of sowing wheat early was, that it might fat sheep, if it was too rank.

Of feeding wheat with sheep.

—Sartain replied, he did not approve of that husbandry; he thought it a presumption, and said, it would be very apt to make the wheat fall and lodge, and carry but a light ear notwithstanding.— I asked him how so; he said, it would shoot forth a small weak spindle after feeding it; and if the straw was small the corn must be so too.— I spoke to farmer Miles on this subject; he said, he looked on feeding not to hurt the wheat in the least, if it were not fed late: it is true, said he, if it be fed after the spindle begins to shoot, it would be the same as feeding French-grass, for then, as Sartain says, the first spindle being taken off, there would come up a weak issue or spindle by it. — Sartain gave me three or four instances on his side the question, and Miles the like on his; and the latter carried me to view a part of Mr. Brewer's farm, which was anno 1699 eat up bare; and had as good a burden of wheat as any in the country. — He looks on the difference therefore to be as above.

Major Liver and I discoursing of the mischief wheat might receive by being fed down with sheep, — especially, said the major, to feed it as many farmers do, who seem to be cautious, and think to be sure to do no harm; and so they only put in a few; whereas, were I to feed wheat, I would put in as many as should eat it down directly; for, when there

there are but a few, they only crop what they should not, viz. the youngest spindles.

I cannot imagine why wheat should be fed at any time, unless it be by one evil to remedy a greater : if the wheat be not so forward as to have tillowed into small stiff spindles, long enough for the sheep to eat it, they can only eat the leafy blade ; but I cannot see how that puts the spindle the backwarder ; it rather seems to forward it, and strengthen it, forasmuch as the sap, which had the leaf to nourish before, has now only the spindle, which consequently must grow the faster and stronger.— But if the wheat be so spindled, that the sheep can bite the spindle off, then it will put it backward to a great mischief, inasmuch as so strong a spindle will never grow up again from that more or root, nor carry so good an ear as that would have done : indeed if a favourable spring comes, especially if the ground be good, the country-man may think he can be no sufferer, because he may, notwithstanding this, have a good crop.— Yet it must be confessed, that one must resort to the evil of feeding, if the wheat be so exceedingly forward as to shoot into ear too early in the spring.

When I shewed farmer Crap and farmer Ginnoway some young green wheat, and let them see there was a young ear above ground no bigger than a pin's head, they both confessed, it was madness to feed wheat with sheep, especially in our hill-country, where the land is not rich ; for in such land, if the maiden-ear be eat off, it must be a weak brother that puts forth in it's room, whatever better may happen in rich land.

Mr. Eyre tells me, that farmer Lake of Faccomb is very much against feeding burn-beaked wheat, and says it will occasion it to blight.— I asked Mr. Eyre why the farmer thought so. He said, he could learn no other reason for it, but that it would be the later ripe, and the backwarder corn is in ripening the more subject it is to blight.— Note,
this

this observation, however he, or any other notable farmer came to make it, pretty generally holds true, though the true reason, why feeding wheat should make it later ripe, the farmers are at a loss to discern.

— The true reason hereof I have before proved, viz. that the ears of wheat in February and March are an inch or two above ground, which maiden-ears the sheep eat off, and then nature is put back to form other ears, which must necessarily put the harvest backward, it may be a fortnight, and also produce a weaker straw, more subject to lodge and fall, in the room of the maiden-stems bit off, and probably with a shorter and weaker ear, unless the ground be very good. — This is like to be the natural consequence of feeding wheat with sheep in the hill-country, where, by reason of the cold, the harvests at best are backward; but these ill effects may not happen where the ground is warm and good, and the country lies low.— If proud wheat were mowed two inches above the ground, this would prevent the mischiefs of feeding; but then I do not see how it would prevent the rankness and lodging of the wheat, since, the ear not being cut off, nature would not be put backward; for the cutting off the leafy-part signifies neither one way nor other; for that makes no advances after the end of May, but then rots.

§. 26. Whereas the *Rei rusticæ scriptores* direct the sarrition of wheat when it comes to have four leaves, as taken notice of before, — I have been at a loss to discover the four leaves of wheat, because it puts forth only three leaves, nor could I ever observe more. — But note, the two collateral leaves die in about two or three months time, and then more leaves put forth; so that in England four leaves never appear at one time, but in a warmer clime, as Italy, the latter leaves may put out before the former are dead, and so four green leaves may be seen at the same time.

Of the sarrition or raking wheat among the antients.

R 3

§. 27. When

Sign of
good
wheat.

Sign of
wheat's be-
ing at a
stand in
growth.

Time
when the
grain is
first form-
ed, April
15.

§. 27. When the ears strut, and the chests stand open, it is a sign the grain plims well, and is full.

§. 28. In the beginning of May (anno 1707) my servant said, my wheat, for want of rain, was at a stand in it's growth.— I asked him, how he knew it; he said, by the spikiness and speariness of the tops; for, when it does not thrive, it runs to a sharpness at top, and does not hold broad as when it thrives.

§. 29. It was the 15th of April (anno 1702) I first observed, that the ear was so early formed; for in pulling away the valves, which were five, at last I found the ear in it's cradle, or inmost valve, which valve was of the length of three pins-heads; the ear itself not above two pins-heads in length: I could not discover it's parts with the naked eye, but with the microscope I could distinguish it's parts plain as in a full-grown ear, and distinguish every seed to be of a watery pellucid substance; the grain being formed by the middle of April, the weather following seems to be of great consequence.

It was observed this year, 1700, that wheat carried a very short ear; for it had been a very wet cold May, and in that month, or near it, it was that the ear was formed, and, if the root be chilled in that month, it will not recover it.

The proverbial rhyme holds not good on cold hill-country lands, tho' consisting of strong clays, which yet is very true, when applied to Leicestershire, and other deep lands warmly situated;

“ I came to my wheat in May,

“ And went sorrowful away;

“ I came to my wheat at ^d woodsheer,

“ And went from thence with a good cheer.—

For, in cold hill-countries, whoever sees not the ground well stocked with green wheat by the beginning of May, will never see a good crop.

^d The word woodsheer is understood for the froth, which, about the latter end of May begins to appear on the joints of plants, and is more commonly called cuckow-spit.

§. 30. There

§. 30. There is a sort of land the country people call * woodfeer ground; in this sort of land, ^{Edge-grown corn on} ^{woodfeer ground.} ^{* Spungy, ferny, poor.} ^{low} early or late, the corn will be edge-grown, that is, much of the blade, after it is come up, will die away and then spindle up again; this must be occasioned by the root's being affected, and not only by the blade's receiving an injury, for then the blades of corn in the neighbouring grounds would be the same, as being exposed to the same air; such ground therefore must be supposed to be of a hollow spungy nature, very susceptible of the air; and tho' it may seem to be closer and more compact than chalky land, yet really it is not so, else the chalky land would suffer the same fate. In these woodfeer grounds the roots of the corn are injured by the cold winds coming to them in March, April, and May, whereby they sicken, and the blade presently discovers it by dying away.

§. 31. The lodging of wheat is often occasioned by a weakness in the straw proceeding from the poverty of the land, it not being able to give nourishment, and so the straw grows limber.— And in very strong land the straw of red-straw-wheat will run to a greater luxuriance in height than the strength of the straw will bear, and then it will lodge. ^{Of wheat's lodging, and the cause.}

§. 32. This spring (anno 1720) being very cold and wet, and the summer by intervals rainy till harvest, and oftentimes the rain falling with that weight as to beat down the best of the wheat in most parts, a month at least, if not five weeks before harvest, yet it did not, as usual in such case, blight, which was wondered at.— The reason seems to be, because the ground by cloudy dark weather, and many repeated and frequent rains, was kept cool, and thereby it fed the corn, so that it did not scorch and burn as in other such years, whereby the green corn that lodged, was not parched up; for it is obvious, it must burn and dry up more in hot scorching weather, ^{Of blights on wheat.}

weather, when it lies flat on the ground, than standing upright it would do; because by standing upright it shades the ground from the sun.

The country-man observes the blight to appear on his wheat quickly after it's blossoming-time, and so concludes the blossoming-time dangerous for blighting; and in all probability it may be so; for the blight perhaps arises from the cold winds condensing the sap and choaking up the pores of the straw, whereby all nourishment that should pass to the ear is intercepted: but if this blight proceeds from a mildew falling from the air, as many people imagine, it cannot be so; for at the blossoming-time the straw is not dry enough to receive and suck in such mildew; it abounds with moisture at that time, like green hay in swarth, and cannot be prejudiced by rain, as it may be after it is become hay, for then it imbibes the rain; — but, as I conceive, the blight appears not on the wheat till after the straw becomes somewhat dry; tho' true it is, the mildew's lodging on the wheat at flowering-time, if not washed off by rain, may continue till the straw be dry enough to imbibe it. — The poorer the land is, or the lighter it lies, tho' rich, the less able will it be to feed the roots of the corn so as to overcome the blight. — Now the reason why wheat or barley is supposed to be past blighting when the grain comes to some hardened pith, is, because the mildew coming on the straw then, it cannot affect the corn so as to blight it, it having by that time got such a substance, as to be maintained by very little communication of sap from the root, according to the degree of which the wheat will shrink more or less. — Perhaps the smut may be nothing else but the highest degree of blight, when the mildew comes so plentifully on the straw as totally to interrupt and stop the rising moisture, — or when the particular bit of dung, or such moisture as lies to the root of the corn

is,

is, by that time the corn comes to kern, wholly consumed by the heat of the sun.

Observing the wheat-ears at blossoming-time, I found, that, at shooting forth the blossom, each cell or chest opens more than ordinary, and, when the flower is come forth, it closes again. This observation seems to account for the blight wheat is said to take at blossoming-time, inasmuch as at that time blighting winds and mildews are let into the cell where the grain is; these mildews whether they proceed from the air, and falling on the plant enter into it's pores, and prevent the sap from filling it, or whether they are nothing more than the sap itself, which, in it's passage thro' the pores of the plant, is checked and thickened by the cold winds, and being unable to fly off, settles on the surface, however this be, they are of that gummy nature, that they may easily be supposed to choak the grain.

OF BLIGHTING AIR.

* Country people look on hot glooms and a warm vapoury air to be blighting and to bring caterpillars and green locusts; if so, this seems to be an argument for mildews falling from the air, and not proceeding merely from cold, for the reason thereof
may

* Mr. Miller gives the following account of blights from the learned Dr. Hales, which in a great measure is agreeable to our author's sentiments. — Blights are often caused by a continued dry easterly wind, for several days together, without intervention of showers, or any morning-dew, by which the perspiration in the tender blossoms is stopped: so that, in a short time their colour is changed, and they wither and decay: and, if it so happens that there is a long continuance of the same weather, it equally affects the tender leaves; for their perspiring matter is hereby thickened, and rendered glutinous, closely adhering to the surfaces of the leaves, and becomes a proper nutriment to those small insects, which are always found preying upon the leaves and tender branches of fruit-trees, whenever
this

may be this ; those insects eggs being laid on the leaves of trees and corn, the weather aforesaid coming, which contains glutinous and unctious particles, may fasten those eggs to the leaves and secure them from being blown away, till the sun can bring them to perfection, whereas, if winds had come, or rains, instead of the aforesaid blighting air, most of them might have been destroyed ; so that such glooms may well be supposed pernicious ; and such air may penetrate into the cells of the chests of wheat, and choak all circulation. — But on the other hand the mildew may proceed from the cold nights that give a sudden check to the sap, which had before been attenuated by these glooms.

If strong winds come when the straw of the wheat is grown a little stiff, i. e. about three weeks or a month before the corn be ripe, a blight often happens ; for the straw, being then stiffened, does not ply with the wind as when full of grassy sap, but by making resistance it loosens the mores or fibres of the roots, which give way or break, as may be seen by the wheat's reclining at the root from the side the wind set till harvest ; whereby nourishment is not so well conveyed, and so the corn shrinks or blights, especially in loose ground, as it happened this year

this blight happens ; but it is not these insects which are the first cause of blights, as hath been imagined by some ; tho' it must be allowed, that, whenever these insects meet with such a proper food, they multiply exceedingly.

The wheat least liable to be hurt by these insects, says Mr. Tull, is the white-cone (or bearded) wheat, which has it's straw like a rush, not hollow, but full of pith, except near the lower part, and there it is very thick and strong. It is probable it has sap vessels that lie deeper, so as the young insects cannot totally destroy them, as they do in other wheat ; for when the straw has the black spots (which he calls the excrements of these young insects) which shew that the insects have been there bred, yet the grain is plump, when the grey-cone and lammas-wheat mixed with it are blighted.

(1712) but, where wheat lay in a shelving ground, quite under the wind, no damage happened.

This year (1712) about the time the wheat was kernalled, and just got into milk, or passing out of it into soft flour, there happened strong westerly winds, which strained the roots of the corn, and made it recline; soon after which it was observed by the country-man, that the corn was generally struck with a blight, especially where the land was weak and light: for some of the fibres of the roots gave way, others broke, and the corn continued to lean from that point, from whence the wind came, till harvest, but in very good land the corn suffered little by the blight. On my clay-lands, tho' the fibres of the roots were strained, yet such of them as were not prejudiced were able tolerably well, from the moisture of the land, to feed the corn beyond what dry and light land could do: — However the straw of all the wheat in the country looked white, and not stained with black spots.—The reason was, because this blight proceeded not from the fat gummy juices of the air, nor indeed from the coldness of the wind, (either of which may choak the vegetable juices and hinder them from ascending through the straw to the ear, whereby the corn may be starved for want of nourishment), but from the strength of the wind damaging and weakening the roots, which are the feeders of the grain, and preventing them from doing their office.— I had such ground, which lay under a hill sheltered from the wind, that was not hurt. All corn, on light and dry ground, ought to be cut sooner than corn lying on a flat clay-ground, because from the cold ground a damp steam will arise, and in some measure feed the corn that leans down more than it can be supposed to do from a poor dry ground, when the corn has lost it's support from the root.

Farmer

Farmer Elton told me, that he had the straw of his wheat grievously blighted, when the ears were not touched. — I told him, I thought that must be, because the wheat was so near ripe that it no longer depended either on the root or the straw for it's nourishment, and consequently any defect in either of them could not affect the ear. — To which he assented, and said, he believed it was the truth of the case.

Of wheat's
handling
rough.

§. 33. The worse wheat is, tho' it be never so dry, it will handle the rougher; because thin and coarse wheat is not so plump and globular as fine wheat, and is often so coarse as to be pitted, and wrinkled, which must needs make it less slippery.

Of wheat's
handling
cold.

§. 34. Wheat will handle colder out of a reek that is two years old than it will out of a reek of one year old; — for in that time, the mists and rimes, especially in the hill-country, will be drove into a reek.

Heavy,
cold wheat
bad for
grinding.

§. 35. January (anno 1705) we had a month's season of very wet and rimy weather, in which time my bread proved very white, insomuch as I was uneasy about it: the miller said, he ground the wheat as fine as usual; the cook-maid said, she used the coarse sieve, as she used to do: at last the miller said, the reason must be the dampness of the weather, which made the wheat grind heavy, and not so fine, whereby the bran was the larger, and the flour the less. — From hence it appears, that wheat, which is heavy and cold, will not yield that flour that dry wheat will, nor consequently that price, which is another disadvantage besides that of not keeping.

Of wheat
that is
grown.

§. 36. Anno 1715, I observed in other persons wheat as well as my own, it having been a wet harvest, that most farmers had some wheat-corn grown, and that such wheat would not yield so much by three-pence per bushel as other corn that was not grown, and yet in such grown-wheat it may be there

was not to be found above a grain of grown-corn in two or three handfuls. — I thought it proper to demand the reason of the farmers, why so few grains of grown-corn in a large quantity of wheat should make so great a difference in the price; at length farmer Isles, of Holt in Wiltshire, gave me the best reason:—he said, where there is but a little grown-corn in wheat it makes a very sensible difference in the bread or pudding made of it; not that the grown-corn only, which is apparent to us, when so little, can make so great a difference, but wherever, said he, so much corn is apparently grown to our eyes, a great deal more is damaged than appears to our eyes; for the flour of corn will be damaged and clammy, tho' it has not gone so far as to shoot either root or spear: it is enough to vitiate the flour if the nib or punctum saliens has swelled so as to crack or burst the skin. — I told Mr. Raymond farmer Isles's judgment of this matter, and he said, it was a notable observation.

Rain coming before I could thatch a wheat-reek, one fourth part of the round being unthatched, the wheat theretook damage by growing; and it is to be noted, that a little grown-corn will do a great deal of damage; 'tis not only the loss of those grains that actually grow, but a foulness and fustiness also, and a smut that they beget in the germen, that rots the corn, so that such ears will fly into dust, like a puff, when they are struck with the flail, and discolour the whole quantity of wheat threshed with them, tho' it had otherwise taken no harm. — It is farmer Biggs's opinion, that it is the best to mingle all together, for the buyers will give nothing for the bad. — All my wheat of that reek also felt heavy and cold, tho' not one fourth part had taken damage; for the unthatched part taking damage, the damp that was thereby received, and pent in when it came to be thatched, did, it is probable, strike a chill to the whole reek.

§. 37. In

Caution to
sell off old
wheat that
is coarse
before next
harvest.

§. 37. In case the spring be far spent, and the summer so advanced, that an early and forward harvest may be expected, and the last year's wheat run coarse, by reason of a cold spring and summer with a backward harvest, it will be best to thresh out such wheat, and sell it before new wheat comes into the market; for the new wheat will carry so much better a body and colour, that the old wheat, when it stands in the market along with the new, will sell to a much greater disadvantage than it would have done, had it appeared by itself.

Antiquity
of burning
stubble.

§. 38. In Moses's song on the overthrow of the Egyptians, Exod. ch. xv. ver. 7. it is said, — "Thou sentest forth thy wrath, which consumed them as stubble," — whereby it appeareth how ancient a custom it was to burn the stubble. — Pliny takes notice that Virgil gives great commendation to the custom of burning the stubble, but he himself thinks it of no other use but that of destroying the seeds of weeds.

R Y E.

§. 1. **R** Y E is a grain seldom sown in the counties I have been most conversant, and, as for my own experience, it has been very little in it.

Rye carried
by the
sheep from
one land to
another.

Farmer Marrant of Essex assured me, that in their common-field one of the tenants one year sowed rye in but two acres, and there was not that year one piece of wheat in the whole field clear from rye. — It was conjectured it must be the common-field sheep crossing over the two acres of rye, after it was sowed, that carried it about in their claws.

Of sowing
rye in Lei-
cestershire.

§. 2. Mr. Putching of Leicestershire informs me, that they sow two bushels of rye on an acre, which

† Sunt qui accendant in arvo et stipulas, magno Virgilii præconio; summa autem ejus ratio ut herbarum semen exurant. Plin.

is as much as they sow of wheat, because, he says, tho' it is a thinner grain, and so more of it goes to a bushel, yet it is also a tenderer grain, and therefore they give that allowance.—He says, in the common-fields in Leicestershire they winter-feed their wheat by consent, but they do not feed their rye, because it is too tender to bear it, and the sheep would make little holes with their feet in open weather, wherein the water would stand to the injury of the rye. They never feed rye.

B A R L E Y.

§. 1. **F**ARMER Biggs of Hampshire tells me, Of rath-ripe barley. he sows much of the rath-ripe barley, that he sows it on clay-ground, because the fault of that land is that it's corn will be late ripe, which is mended by that barley : rath-ripe barley, he says, ought to be sown early, or the corn will be thin ; he sows it in March. But farmer Elton, his neighbour, says, some sow it first, and some the last of barley : he also says, it ought to be sowed in good strong ground, else it's straw being very hollow will be weak, and so be beaten down and lodge.

It seems that rath-ripe barley should be sown on better ground than other barley, because, ripening the sooner, it may be supposed to exhaust the goodness of the land, and to draw it's moisture from it faster than it can well give it, the corn coming to it's perfection in so much the less time.—— But Mr. Raymond assures me, that with them, near Patney in Wiltshire, they sow it in the poorest sandy ground.

Conformable to what Mr. Raymond had told me, a good farmer, and neighbour to both Biggs and Elton, is positive that on his poor gravelly ground it is much the best to sow rath-ripe barley ; for such land will not hold out in feeding the late-ripe corn long enough, but will give off before it is ripe ;
therefore

therefore the rath-ripe barley does better, to ripen which there is not so much patience required ; but quære how far this may hold also with white earth, which is the sort of soil Biggs's and Elton's poorer land consists of.

I sowed this year (1707) rath-ripe barley in very poor white ground ; I also sowed the same in very good strong clay-land : no rain fell to bring it up till June, and after that we had frequent showers, and plenty of rain till harvest, and yet I observed my rath-ripe barley in the poor light land miserably bent, broken in the straw, and harled or fallen down : in the strong clay-land it did the same, but not so much, tho' the straw, and the leaf of the straw was blighted, and full of black specks, the ear thin, and it's colour lost in all the rath-ripe barley, whereas the straw of the late-ripe barley was both free from these spots, and stood upright with good strength. — I do infer from hence, that, seeing the clay-land in our hill-country, tho' in good heart, and the moistest ground we have, and in a moist year too, cannot sufficiently feed the straw of the rath-ripe barley, so as to enable it to stand upright, but suffers it to be languid and withering ; I say, from hence I infer, that rath-ripe barley cannot be a proper sort of barley for us to sow ; because in our hill-country, where the straw breaks or starves three or four weeks before harvest, it must needs be a thin coarse grain ; therefore in our hill-country it is best to sow late-ripe barley, tho' we should provide three or four horses extraordinary against sowing-time, in order to get the corn into the ground a week before May begins.

This year (1707) rain not falling to bring up the spring-corn till June, one half of the seed, that which fell deep, came up without rain, but the rest not till rain came. — This gave me the opportunity of making the following obvious observation

tion on the misfortune that rath-ripe barley is subject to in such years, viz. that half that came up first, by reason of the weakness of the straw of such barley (as above set forth) could not wait for the ripening of the latter edge-grown corn in the same field; but it's straw bent, broke, and harled, and the ears buried themselves among the broad-clover sown with the barley, so that I was forced to cut it, not being able to stay a week or ten days longer for the edge-grown corn to ripen; whereas, the late-ripe barley stood so upright in it's straw, that the corn, which first came up, would stay ten days for the edge-grown corn.

In May, (anno 1702) I asked Mr. Raymond whether he was not of opinion that rath-ripe barley, by reason of the weakness of it's straw, was often apt to fall down to the ground, just when ready to mow. He replied, with them they had no stones, so that was no hindrance, unless by the bending down of the ears the scythe might cut off some of the ends of them, which mischief he had not observed to be more in that sort of barley than any other; —but that in rath-ripe barley there is this mischief, said he, we hold, viz. if the ground be good, and the year a feeding year, rath-ripe barley is apt to run rank, and to fall whilst very green in ear, which occasions the grain not to fill, and is the greater mischief; therefore, said he, this year I sowed common barley; but such a hot dry spring as this there can be no danger.

It was very manifest to me, this year (1706), that the straw of the early-ripe barley is thinner and weaker than that of the late ripe barley; for all my rath-ripe barley (of which I sowed fifty acres in different sorts of ground, and some of it side by side with the late-ripe barley) did crumple down in the straw, when the late-ripe barley of the same forwardness

wardness and growth stood upright ; and this year I also observed in all my rath-ripe barley, that the grain was thinner than that of the late-ripe, which I impute to the dry scorching summer ; the straw, being thinner and weaker, was less juicy (as we find by giving it to cattle) and sooner dried up, and the want of nourishment sooner appeared in that sort of barley ;—but farmer Biggs says, that in wet summers he usually observes the rath-ripe barley to be the fullest bodied corn.

It seems plain to me, that rath-ripe barley, as it should be sown early, for reasons before set forth, so it ought not to be exposed to the north, but ought likewise to be sown in pretty good ground, either by nature, or made so by art ; for we know, the poorer the ground is the weaker and poorer the straw will be in all sorts of corn ; and if the rath-ripe barley has by nature a weaker and thinner straw than the late-ripe barley has, and on that account is apter to crumple, to bend down, and to break in the straw before it is ripe, much more will it be apt to do so, when the straw is made much thinner and weaker than naturally it would be, by the poverty of the ground it is sown in.

It is very evident to me this year (1720), that rath-ripe barley ought not to be sown on poor ground, and much less so, in case it lie declivous from the sun towards the north.

Of middle-ripe barley. §. 2. An experienced farmer of Somersetshire very much persuades me, that the middle-ripe barley would be the best I could sow at Crux-Easton, and that I should thereby avoid the inconveniencies incident to rath-ripe barley ; viz. that of crumpling and falling down, or being knee-bent, and that of the thinness of the grain, from thence arising ; for if by much wet it falls down too long before it be ripe, the barley will thereby be stunted, and will shrivel

shrivel and shrink ; for no nourishment passes after the breaking or bending of the straw ; but this middle-ripe barley, said he, will stand upright till harvest, and then the straw makes better fodder than the other. — I replied, I had tried it, having bought it for seed, in our neighbourhood, but found no success. — He said, he did not wonder at that, for he had done the same ; but, said he, you must buy it from about Bemerton, near Salisbury ; in that case I found it quite another thing : buy a load yearly to keep up change.

It was very evident to me, after I had sowed middle-ripe barley, that the corn which grew on that part of the ground declivous from the sun did not ripen so soon, nor stand so long upright as the rest, but in many places fell down flat into the grass ; so that middle-ripe barley, tho' it better bears late sowing, even on a ground declivous from the sun, than rath-ripe barley, yet it will neither bear the one nor the other so well as late-ripe barley will do, nor will it's stalk stand so long.

It is observable that the middle-ripe barley above-said, which was sown at the bottom of the field, lying on a flat, ripened altogether, and looked white and very * suant, being forwarder than that part of the ground which lay on the side of a hill declivous to the sun ; but again, four or five luggs wide, in the bottom between the hills, it ripened as soon, and looked as white and suant as in the abovementioned bottom that lay open to the sun and air ; but on the side of that hill that sloped from the sun the corn was more edge-grown, and lay backward, and neither looked so white, nor was so ripe. This shews that a bottom ground, or a vale pent in between two hills, tho' shaded by one from the sun ; yet, by means of the warmth and closeness of the air, will many times ripen as fast as a ground lying declivous to the sun.

* kindly,
flourish-
ing.

Of the nature of rath and late-ripe barley.

§. 3. It does not seem very easy to make a conjecture of the nature of late-ripe and rath-ripe barley, and to give reasons why the late-ripe agrees best with cold, and the early-ripe with hot grounds, and with a hotter climate; but I shall venture however to deliver my notion of the matter. I conceive the reason why one sort of grain is late-ripe, another rath or early-ripe, is from the stamina and constituent parts of each grain, which in the rath-ripe sort are of a looser and opener texture in the fistular parts and glands. The rath-ripe barley having finished it's course, and come to a maturity in less time by being committed to a warm bed, shews the vessels of the seed to be less compact, and the fibres and ligatures not so well strung, and their tones looser than those of the late-ripe; for the quicker the growth of the solids are, in animals as well as plants, the parts which contribute towards such growth and increase are less solid and compact, as carrying with them a greater mixture of fluids, which are the necessary medium for consolidating the harder or drier particles, which united make the solids, and therefore, the cement being of a looser substance, no wonder if the fibres of such seeds are so too: thus the parts of the rath-ripe seeds are not corded, braced, or faggotted together with so strong an union or texture as the late-ripe seeds, which last being sowed in cold ground, and in a cold clime, the vegetable juices are sent up in less plenty, and the particles that contribute to the solids are not overflowed with so liberal a quantity of fluids, which are therefore the firmer maturated and digested; from hence it must follow, that the passages of the fibres and glands in such seeds are streighter, and the juices are longer in filtrating through them; from whence it must appear (which is the question in hand) how the late-ripe seeds agree best with a cold clime, and cold

cold ground, and the rath-ripe seeds with a warm clime, and warm ground; for the stamina of the late-ripe seeds are closer, harder, and more compact, and there is a stated time for every distinct progression in vegetation. The *Rei rusticæ scriptores* tell us,—that after so many days each sort of corn puts forth so many leaves, then has such a stated time for flowering, and such from thence for finishing the seed, and such for ripening it: so, agreeable to the constituent parts of the seed, through which the vegetable juices are to pass; there is such a stated time to be completed in each station and progression, before nature can rightly finish one work, in order to another, till the end of her intention is answered, viz. that seeds of increase are produced from a seed. — From hence it follows, that colder earth, and a colder air, answer the nature of late-ripe seed better, because the vegetable juices are not forced up the plant in a more furious manner than the vessels can receive them, or go hand in hand with them in growth; for the fibres and fistular parts of a plant, or a fruit, are to proceed gradually in extension of parts, as well as in fulness of juices, and there ought to be such an increase of juices as is proportionably adapted to the extension of the fibres, that one work of nature may not outrun the other; for if the heat of the ground, or the air, hastens the juices of the ears of late-ripe barley to maturity faster than the fibres of the grain (being of a harder texture) will be extended, or admit of extension, it follows that such grain will not arrive to it's perfection, or full growth, but must dry and harden before it is come to it's full body. — So, on the contrary, in rath-ripe barley (in which the fibres are loose, and consequently by nature disposed to a speedier extension) in case the ground it is sowed in be cold, the fibres of the

seed of increase will run on faster in extension, and so to maturity or hardness, than the cold juices of cold land, in a cold air, will ascend to plim and plump up the seed, and from this ill match or marriage must arise a leanness of seed in the increase.

* loose at
foot.

By what has been said of the properties of late-ripe barley, it is evident, that, if it be edge-grown, the ears that are first ripe will better wait for those which lye behind, or are greenish, than the forward-est ears of rath-ripe barley can do; for that will fall down, and be * more-loose, if you delay the cutting of it when ripe.

It seemeth to me from the experiments I have made, that late-ripe barley will better endure to be sowed when the ground is wet than rath-ripe barley will do; the reason of which I take to be, because the late-ripe barley is (as all other late-ripe seeds of the same kind are) closer in it's texture, and more compact in it's parts, and consequently more resists moisture than the rath-ripe barley does, which is opener and looser in it's parts, and consequently drinks in moisture more freely, and is sooner chilled thereby, or made drunk therewith, and so it bursts.

Of sprat or
battle-door
barley.

§. 4. Mr. Clerk of Leicestershire informed me, that sprat or battle-door barley required a strong good land, that it's peculiar property was, that it would not run up to a length of straw, tho' in good land, so as to lodge, as other barley would, and that it had a stronger and more pithy straw, but not so good for fodder.

Mr. Ray, fo. 1243, speaking of battle-door or sprat-barley, says, it is thought to be more safe than other barley from the depredations of birds, because it's grains are more difficult to be torn from the ear than the grains of other barley.

J. Mor-

J. Mortimer, Esq; F. R. S. fo. 100, — the sprat, or Fulham-barley is the best for rank land, because it doth not run so much to straw as the common sort, and yields much better.

Mr. Johnson of Bedfordshire, of whose judgment I have a great opinion, after he had sown great-wheat in a new broken up very rich pasture-ground (which sort of wheat he chose, because it was the least subject of any to lodge) and the next year had sown beans, the year following, being the third year of sowing the ground, took me with him to view it, in order to advise with me what grain he should sow: he thought it would be too rank for barley, because that is more apt to lodge than oats, and also too rank for oats, and was therefore inclinable either to sow great-wheat and red-straw wheat mixed, that the former might help to support the latter from lodging and falling, it being a rank ground, or else to sow red-straw-wheat alone, because, next to great-wheat, that supported itself the best. — I have known great-wheat and red-straw-wheat often sowed in the north, in good land, for the same reason. — I agreed with his reasons, as being good, but told him, I should rather recommend battle-door or sprat-barley, if he would send for it from beyond London, it being not only a shorter, but also a stronger strawed barley than any in the north, and therefore fitter to sow on rich land, in order to prevent lodging, and was also good to mix with other barley, to help to support it.

§. 5. Mr. Ray, speaking of the square-barley, or winter-barley, called also big, says, it is commonly sown in the mountainous parts of northern countries, where other kinds of barley will not bear the winter; but this sort is not hurt by the frost.

The six-square barley, vulgarly called barley-big, is sowed in Leicestershire in small quantities, but, Of square barley or barley big. tho

tho' it is a great increaser, they told me they did not like it, because it was not good for malting, it had so thick a rind. — Mr. Glen of Hawthorne said, to sow a little of it for poultry did very well; but, said he, for the most part they sow it in Northumberland, and so far northward, because it will endure the winter, whereas the lenten-barley will hardly ripen with them.

Rich land
makes bar-
ley thin.

§. 6. Farmer Elton having been at Major Liver's to buy barley for malting, I asked him if he could deal, he said, the major had good barley, but having rented the parsonage of Husborne for six or seven years, he had so much bettered his own ground, that his barley was apt to run out too far in length and be thin. I asked whether the richer the land the thinner the barley. He said, yes, if the ground be not thick and full seeded.

The thin-
rinded bar-
ley notow-
ing to the
richness of
the land.

§. 7. Mr. Smith of Stanton assured me, that eminent malsters, whom he named, had told him, that the boldest barley and the best bodied for malting came off of the strongest land. — I suppose their meaning was, where the land lay both very dry and healthy; not land of a cold clayey nature, but such that had mellowness and lightness with it's strength, such as the Leicestershire and Northampshire-lands are, and such as the lands are about Bishop-cannons in Wilts: what Mr. Smith said was on account of the preference generally given to hill-country-barley, which, as I take it, depends on this distinction, viz. the hill-country-barley is generally better esteemed by the malsters than the vale-barley; because the hill-lands are often dry and mellow, as well as of good strength, but the vale-lands are generally too wet, cold, and clayey; instead of which, did the vale-lands exceed the hill-lands in strength, and yet were of a mellow and dry mold, no doubt such vale-land would bring the best bodied barley.

— I speak

—I speak this to shew, that poverty is no ingredient requisite in land, for carrying a plump and fine-rinded barley; yet it is true, that poor land, lying dry and warm, must be allowed to bear better barley than rich land that lies wet and cold; for barley does not stand so much in need of strength in land as of the healthiness and warmness of the soil, tho' both are best, where they can be had.

§. 8. * Upon observations made on my barley ^{Of barley's} this year (1711) after I had threshed some of diffe- ^{degenerat-} rent sorts, viz. that which was earliest, middlemost, ^{ing,} and last sown, all of my own seed, as also barley from seed bought of Mr. Cox of Westover, I plainly see the reason why barley sown on our hills, from year to year, of our own seed, without changing, must in time so degenerate, as not only to produce a very thick-rinded, and cold glewish-floured barley, but as small also as a black oat: wherefore Crux-Easton being cold both in it's lands and it's situation, is necessitated to be sown later, and the ground not forwarding the corn in growth, as warmer lands do, the harvest must be later, all which contribute to the producing a thick rinded, and cold floured barley: barley, being tender in nature, requires a warm soil and clime.—Now if you will sow the seed-barley produced from such a place, being

* Mr. Tull, in his chapter of the Change of individuals, says, — Seeds in their natural climate do not degenerate, unless culture has improved them, and then, upon omission of that culture, they return to their first natural state. He argues in this chapter, that the reason why individuals of all kinds of grain, as wheat, barley, and vegetables in general, degenerate, is owing to the effects of different climates, as heat, moisture, &c. and instances, that flax-seed brought from Holland, and sown here, will bring as fine flax as there, but the very next generation of it coarser, and so, degenerating gradually, after two or three descents becomes no better than the common ordinary sort; — that common barley, sown once in the burning sand, at Patney in

being coarse, thick-rinded, and cold in flour, it will require more days to root and spear in than the bought seed it proceeded from, which came from a warm land, and will also strike less bold roots to forward the grain towards maturity in the course of vegetation; from whence it is manifest it will still come to a later harvest, and consequently be every year coarser, and every year proportionably degenerate.—As for wheat and oats, they are hardier grains, and will bear sowing early in cold land, and so come to maturity in good time, and therefore will not so soon degenerate, tho' the seed should not be so often changed.

As I have taken notice of barley's degenerating, and becoming coarser and coarser every year, by reason of it's being longer in coming up, so without doubt in such coarse barley the nib or germen, and all it's parts, even the seed of the seed is coarser in it's texture.

Caution—
to sow
good seed.

§. 9. Anno 1699, after barley-seed-time there was for about a month a very dry season, so that but very little barley came up, and, except rain came, it was very likely the whole crop might be lost, and, in case a very wet season had come, it had been the same; from whence I observe of what great consequence it is to put very good seed into the

in Wiltshire, will, for many years after, if sown on different warm ground, be ripe two or three weeks sooner than any other, and is called rath-ripe barley; but if sown a degree farther north, on cold clayey land, will in two or three years lose this quality, and become as late ripe as any other. Note, he has no great opinion of this barley, as being of a more tender sort, and thinner bodied than the late-ripe, and not recovering a check from cold or drought so soon as the other. — Weeds, acorns, hips, haws, &c. says he, are thought to have been originally the only natural product of our climate: therefore other plants, being exotics, many of them, as to their individuals, require culture and change of soil, without which they are liable, more or less, to degenerate.

ground;

ground; for without doubt such seed will better endure all sorts of extremities of weather than bad seed can do.

§. 10. About the middle of April (anno 1705) ^{Experiment to shew the advantage of sowing full-bodied good seed.} I sowed twenty-six acres of barley with seed that came out of an unhealthy cold ground, that usually run very thin; so that, however suitable the change of the ground might be, I doubted whether so thin a grain as most of this was could be so profitable as a fuller bodied grain.—To try the experiment, I took sixty grains of this corn, of three different sizes, viz. twenty grains of the biggest, twenty of the middle size, and twenty of the smallest corns: I put the twenty of each sort in three several pots, with rich mold of the same sort in each pot: in eight or nine days time I found thirteen of the fuller bodied corns were come up, nine of the middle-sized, and but five of the smallest; but the fullest bodied corn, both in colour and breadth of blade, exceeded either, and both the other sorts.—In three days after I found nineteen blades of the biggest sort come up, seventeen of the middle size, and thirteen of the least: in three days after the twenty blades of the best and the middle sort were all come up, but of the worst only seventeen blades; but as these blades of the worst sort carried a manifest disadvantage in colour and breadth, and doubtless many of them would never have come up at all in poor ground, tho' the better sort might all have grown, so I question not but I shall find the same disproportion in all the tillows, ears, and body of the grain.

§. 11. If you sow rye-grass, or French-grass ^{Of sowing grass-feed with barley.} with barley, it is to less purpose to be curious in your barley-feed: when you sow grass-feed with barley, it matters not if there be any trumpery of oats, &c. in it.

§. 12. At

Caution—
not to buy
barley-
seed till
near sow-
ing-time.

§. 12. At Christmass-time (anno 1700) several good farmers being with me, I was enquiring for peas and barley for seed.---They replied, that the housing of corn had been so good this year, the buying of seed might be ventured on the earlier, else they used not generally to buy their seed-barley, nor seed-oats, but just before sowing-time, lest they should smelt by heating, and so not grow.

Of sowing
malted
corn.

§. 13. Mr. Thomson, malster, assured me, that after barley is malted, and the coome and dust taken away by screening it, and some time after past, the malt will grow; for, said he, I have sowed it in my garden; but it will come to nothing; from which I conclude, first, the great consequence of the flour in corn, to strengthen the root, and to nourish the grain in flinging out good roots, which in the malt is spent and wasted before it is laid in the ground; secondly, I infer from hence, that the seeds of many weeds, after they have lain some time in the dunghill, may grow, tho' thereby malted.

Farmer Bond assures me, that Mr. Edmunds, the receiver of my Hampshire-rents (being a malster) having taken lands in the beginning of May, and no barley being to be had, he, by the persuasion of his malting-servant, made use of barley he had wetted, and was just well chitted or sprouted; he says, he saw the crop, and it came up very well, and was as good corn as any he saw that year (1703).—So that it seems to me, barley a little forwarded by the malster may be good to sow, though malt thoroughly made is stark naught.

Cook, the gardener, fo. 9. — I do advise my countrymen, if late in sowing any of their grains, especially barley and wheat, to steep them; if your grain be speared, it is never the worse, provided you sow it before the spear be chilled or dried.

§. 14. It

§. 14. It is agreed, that is the best sort of barley, The marks of good barley. that is not blackish at the tail, nor has a deep redness, but is of a pale lively yellow colour, with a bright whitishness in it, and if the rind is a little curdled, so much the better.

§. 15. It is said, that the curdled-rinded barley Cause of curdled-rinded barley. is the finer sort, and has the thinner coat. — Being in the barn, and handling both the smooth-coated barley and the curdled-coated, I perceived the reason thereof; for if barley comes to sweat in the mow, and to dry, if it be thin-coated, it will curdle, but the rind of thick-coated barley, being stiff, will not shrink, but will lie smooth and hollow, tho' the inside flour shrinks from it.

§. 16. The 2d of May (anno 1720) farmer Sartin went out into the fields with me, and on viewing three or four fields of barley, which had been come up about a fortnight, he observed, that the barley of their country, i. e. North Wiltshire, came up with a stronger green colour, and did not look so pale or yellow as in our country, of which I am also very sensible, and do judge it proceeds more from the coldness of the land and country, in the first sown barley, than from the poverty of the ground; because such manifest difference will not be at the first coming up of the latter sown corn of our hill-country, nor will so great a difference appear between our barley and their's by that time June comes. Barley at first coming up, of a paler colour on cold land.

§. 17. When barley is ripe, it will double and bend down it's head; at the same time you'll find some ears to stand upright, tho' the grain may seem full hard and dry, but the straw of such ears, especially at the knots, will be greenish, and will therefore be apt to heat in the mow. To know when barley is ripe for cutting.

§. 18. Mr. Ray, fo. 1243, speaking of barley- Of the number of grains in each ears, says, they sometimes contain twenty grains in each

each row,—Note,—I never yet saw above seven-
teen or eighteen.

Showers
before har-
vest make
the rind
fine.

§. 19. This year (1706) not only in Hampshire and Wiltshire (where I saw abundance of corn, and had good intelligence from others) but also in Banbury-market (where I saw the sacks of corn) as well as in Leicestershire, and by account from Mr. Clerk, in all the counties northward, the barley carried a coarse and thick rind.—For three months before harvest no rain fell; so it seems, that some showers before harvest are useful to make the rind fine.

Knee-bent
barley—it
does not
mow well.

§. 20. The barley this year (1702) was knee-bent, and would not therefore mow well; for in such case, it being loose in the ground, the scythe, instead of cutting, carries the straw away with it root and all, which deadens the scythe's cutting what is farther on before it.—This proceeded from the dry summer, whereby the earth being loose, it loosened the roots of the barley, and consequently the grain could not fill.—I observed what they call knee-bent, and that the stalk was bent from the root in the manner of a bow or hollow for two or three joints, like leaning on the ground, which must arise from the corn's falling by being loose, and then it rises upwards again from upwards of half the straw, toward heaven, as all trees and plants do that fall along; their shoots will still arise perpendicularly, and this occasions the bow in the straw, which is called knee-bent.

When the barley, (as above described) is knee-bent, in such years, by the breaking and bending of the straw, not only the grain is much thinner and coarser, by having it's nourishment intercepted, but the straw also is, for the same reason, much poorer, because by those breakings and bendings the juices are stopt from rising: such years you must expect great waste to be made in the straw; the cattle by refusing

refusing much of it will make oughts ; and in such cold wet years, in the cold clay-hill country, the barley is apt to look reddish and stained at the germinating or sprouting end.—I would advise all husbandmen to avoid sowing such barley, especially in cold land, for tho' it be not dead, 'tis too much like it, and will come away very untowardly in malting, much of it lying behind on the malting-floor, and, should it come away no better when sown, it would be edge-grown, and as very many grains of such barley will never make malt, so neither can they be fit for feed.

§. 21. July 20th (1704) I observed many full-grown ears of barley lying along in a tract in the field, and withered, which seemed to be a great spoil ; I took them up, and found the hares had bit off the straws at the ground, to make a more convenient track.

Of hares
biting off
barley.

§. 22. The same day I observed several grains of barley, almost ripe in the ears, to have worm-holes in the outside, like those in nut-shells ; the flour of these grains was eaten up.

Of worms
eating bar-
ley.

I have observed that a worm is blown by some fly in the spring underneath the barley-ear, when young in grass ; I do not suppose however the same happens to wheat, that having endured the winter, and being coarser to their tooth ; but I suppose the same thing may happen in black oats.

§. 23. Edge-grown barley, (i. e. such as is not full ripe with the rest, tho' all cut together) is very discernable, tho' it should dry in the swarth never so well ; for such edge-grown barley, when threshed, will look of a horn colour, and have a sleek smooth white coat like good wheat, but it will stand hollow from the flour, because that, being pulpy, is shrunk away from the coat.

Of edge-
grown bar-
ley.

§. 24. August

Of burnt
barley—
worm-
eaten.

§. 24. August the 15th (anno 1703) I observed much burnt barley, and opening the black grains I found a maggot in many of the wholest of them, where the grain seemed to be preserved somewhat intire; the maggot lay towards the top of the corn, was of a bluish colour, and had little legs to crawl with.—I suppose the other grains in the burnt ear might have had maggots too, but they being moldered away, the maggots were gone.—And yet it is strange that burnt corn should proceed from this maggot blown by a fly, seeing in burnt corn of all sorts every grain in the ear is burnt, and so is the ear of every spindle from the same root, and the ear is burnt before it gets out of the hose;—and yet it is strange a fly should choose a sooty burnt place as a fit matrix to lay her flie-blow in.—Quære of this earlier in the year.

Of mow-
burnt bar-
ley.

§. 25. If corn come into the barn greenish, and is trod in the mow, it will be mow-burnt; for which reason it should be laid light and easy.—The inconveniency of mow-burnt barley is very great, for it will neither make malt, nor will the hogs eat it freely.—It is as bitter as foot, and when the malsters bite it, it is as red as a fox within-side, and if you sell a parcel of it to a malster, tho' at a low price, he will never come again.

Airiness therefore is convenient to a barn, to keep the corn from heating, for, if it be hastily brought in, as it often must be, and before it is fully dry, it will through heat be parched, and sometimes set on fire: this heat will make the barley red at one end, so that it will never come in malting, and a reek in the barn will often be so hot that there is no enduring to be upon it.—Farmer Elton once thought that he should have had a reek of barley fired in the barn by heat, and he was forced to cut a great hole down to the bottom of it, but could never stay at it
above

above a quarter of an hour at a time for fear of being overcome by the heat.— It is barley and oats that are chiefly subject to heat, because the undried weeds are brought in with them, whereas there are not so many weeds among wheat.

O A T S.

§. 1. ^a **A** Farmer dining with me, I was giving the reason why oats impoverished the ground beyond other grain, and said, that it was not only because the farmer generally sowed oats, when the land would bear nothing else, and so it being

Why oats
impoverish
land.

* Mr. Miller, in his Gardener's Dictionary, reckons four species of oats, viz. common or white oats,—black oats,—naked oats,—and red or brown oats.—— The first sort here mentioned, says he, is the most common about London: the second sort is more cultivated in the northern parts of England, and is esteemed a very hearty food for horses: but the first makes the whitest meal, and is chiefly cultivated where the inhabitants live much upon oat-cakes.—The third sort is less common than either of the other, especially in the southern parts of England; but in the north of England, Scotland, and Wales, it is cultivated in plenty. This sort is esteemed, because the grain threshes clean out of the husk, and need not be carried to the mill, to be made into oat-meal or grist. An acre of ground does not yield so many bushels of these as of the common oats, by reason the grain is small and naked, and goes near in measure; but what is wanting in the measure is supplied in value.—The red oats are much cultivated in Derbyshire, Staffordshire, and Cheshire, but are never seen in any of the counties near London; tho', as they are a very hardy sort, and give a good increase, they would be well worth propagating, especially in all strong lands.—The straw of these oats is of a brownish red colour, as is also the green, which is very full and heavy, and esteemed better food for horses than either of the former sorts.—Our author speaks nothing of the naked, or of the red oats, but only of white and black, excepting that he mentions the Poland sort, which is also a white oat, and of a shorter grain than the common.

the last grain sowed, he was apt to impute the following poverty of the ground to that only, but that grain is commonly sown on one earth, and consequently does not fall so deep into the ground as corn sown on two or three earths, and therefore oats prey more upon the goodness of the land, than any other corn; for they eat up all the fatness that the sun, dew, or rain give to the surface of the ground, they lying so shallow, and for the same reason ground will bear oats that can bear nothing else; that grain lying so shallow lives on the nourishment the sun, rain, and dews daily administer.--- And the farmer added, that a load of oats in the straw was heavier than a load of any other corn in the straw, and may therefore exhaust the ground more,---and note further, the increase of oats is greater than of any other grain.

Of the
burning
quality of
oats.

Virgil, and the Romans who wrote of agriculture, often use *uro* for *emacio*; (as, *urit avena*) yet we find fire in all cases enriches the earth: but the old signification of *uro* was also *to chill*. And cold is analogous to burning, as having the same effect, which we see by it's withering up leaves.

Of the roots
of oats.

§. 2. April 30th (anno 1705) I first observed, that from the oat many rooted-fibres shoot forth, and the stalk that rises upward takes new root again on the surface of the ground, at a certain distance from the first root, according to the depth the oat lies in the ground, so that the oat has two ranges or tires of roots: no wonder then that oats should draw off the nourishment of the earth more than barley.

White oats
require fat
ground.

§. 3. According to the best observations I can make, white oats require a fat and feeding ground; for the halm, or straw running to a great largeness cannot be supported without good juices and moisture; I have also observed, that white chalky ground, tho' in never so good heart, will be unfruitful with
white

white oats; nor will a mixed mold, between white earth and red clay, of which we have a great deal in our hill-country, be feeding enough for them: our red clays, and white clays, when in good heart, carry moisture enough, and are very fit for that grain.

— It seems to me, that white oats may be sowed when the ground is moister than barley will endure it to be, because barley, having a thinner coat, is sooner chilled by quick imbibing the wet, and many of it's vessels may perhaps burst, whereas white oats resist the entering of the moisture; they, having a double hull, are protected, and cannot so soon be drowned.

§. 4. I took in a reek of black oats of thirty-eight loads, and a reek of white oats of twenty-eight loads, and when they were threshed, I found the reek of white oats yielded more than the reek of black oats, of which I spoke to some farmers; they all agreed, that white oats always yielded better than black oats, and said, that an ordinary crop of white oats was accounted as good as a good middling crop of black oats.

§. 5. Anno 1703, having sowed white oats they proved blighted, but, as I thought, none had britted; yet in November I saw a multitude of oats springing up very thick; I seemed concerned, as thinking I had had a great loss by the shattering,— but an old husbandman said, it was the nature of white oats, when cut, to spring up again from the old root, but they would die away when the frosts came, but that black oats would not shoot forth blades from the old root. — Some time after I dug up many of them, and found no such matter, but there was an oat-hull at the root of all of them.

Farmer Wey, and farmer Farthing of the Isle of Wight told me, that they, and several other farmers in the Island had cut oats this summer (anno 1707)

White oats
yield bet-
ter than
black oats.

White oats
said to
spring
again from
the old
roots.

which came from the roots of the last year's oats, and had shot roots, and tillowed from thence notably, and yielded very good crops; but, that I might not be mistaken, I asked them over again, if it was not from the brittings of the last year's oats; but I found they were well acquainted with a bastard-crop of oats; and they both said, that they had pulled up the stubble, and it appeared plain that they were issues from the roots of the last year's stubble.

Black oats
liable to
blight sown
on lay-
ground in
dry cold
springs.
Of the Po-
land-oat—
loves moist
ground.

§. 6. In dry cold springs, and hot summers following, black oats sowed on lay-ground, tho' clay-land and rotten, will be as subject to blight as winter-vetches sowed in such lay-ground, as it happened to both anno 1714.

§. 7. Anno 1709; in some of my wheaten-ground ploughed up this year, because the wheat was killed by the hard winter, I sowed, in the beginning of May, in part of it rath-ripe barley, and in part of it a white Poland-oat: both grains were put into a ground of equal fertility and moisture, and on the same day.—I doubted not but the Poland-oat would be first ripe, and was therefore surprized to see the rath-ripe barley come up four or five days before the oats; I observed also in other grounds sowed the same day the barley to do the same.—I soon concluded the reason to be, that the oat having a double hull, and so better guarded from moisture, could not so soon imbibe the vegetable water as the thin-rinded barley could, though doubtless, the texture of the flour of the oat, and the infolded fibres of the inclosed plant being softer, would consequently grow faster.—The corollary from hence is, that if you would be secure of the growing of Poland-oats without the help of rain, they must be committed to the earth with more moisture in it, or before it is so dry as it ought to be for barley to be sown in it; not only because the oats require more moisture to make them

them grow, but also because they lie so many days longer in the ground before they come up than the barley does. The drying ground by the heat of the sun may be greatly exhausted of the moisture in a few days, which otherwise had been sufficient to have set the Poland-oat a growing.

§. 8. One of my neighbours was telling of me, he thought oats would be cheapest at Christmas, and he would buy them then against seed-time. — I answered they would never keep, for oats of all grain keep the worst, and they would not grow if fusty, for I knew a great many farmers would lay up barley about Christmas for seed, in order to kill the oats that might be in it, presuming the oats by seed-time would be spoiled for growing. It is manifest that oats take heat in a heap, and by the great wet which comes from them, when heated over the kiln for oat-meal, it is plain they have great moisture in them; otherwise one would think their hulls would preserve them better than any corn. — From hence it appears why oats are generally dearest at seed-time.

§. 9. I was speaking to another farmer about pined or musty wheat, and saying that it would not grow. He said, it was true; but added, that pined or musty oats were more difficult to grow than any other sort of corn, and yet, said he, I have known musty corn grow well enough. — I replied, it was because it was sown on it's first growing musty, before it had received any check by growing cold again, it being then taken in it's growing condition. — He was of my opinion for the reason I gave.

I had an oat reek, which, taking wet before it was thatched, when it was brought into the barn seemed to be in an ill condition, and three weeks threshing lying on the floor in the chaff, the heap grew very hot, which I had observed for two or three days, and before I winnowed them I thought they had been

Oats will
not keep
well —
therefore
dearest at
seed-time.

Musty oats
will not
grow.

And to
know them
by their
colour.

spoiled. — Yet my bailiff would persuade me to sow them, assuring me, that he had known heated oats grow very well, though heated much longer after winnowed than these had been. — I got Mr. Bachelor of Ashmonsworth to look at them; he said immediately, when he saw them, they would grow very well; for, said he, they have not lost their colour, whereas oats, that have taken heat so much as not to grow, will look as red as a fox in their hulls. — All who were in the barn said so also, and that they had seen vetches that had been heated look so too.

Of white
oats and
their til-
lows.

§. 10. Being in company with two farmers, we were talking of white oats: they both assured me, they had often heard it said, that white oats came up single from their roots, and did not tillow as the black oats did, but —

I could not find by Mr. Raymond (though I had noted an opinion to the contrary in Hampshire) but that white oats would tillow as much as black, and he sows as many on an acre as he does of black oats; — but of all oats whatever, if a ground works rough, so that many grains are like to be buried, they sow the more, viz. instead of a sack, five or six bushels.

Of burnt
oat-ears.

§. 11. July 17th (anno 1703) I observed to-day, that the burnt oat-ears have the straw perfect, and of a good green colour, and their pedestal also, on which the grain hangs, the same, and the grain seems to have arrived to a good bigness, as in wheat and barley, before that blight fell on it; for certainly the grain could not grow after.

Of oats
shedding.

§. 12. White oats are most apt to shed as they lie; and black oats as they stand. J. Mortimer, Esq; F. R. S. fo. 104.

Oats will
not ripen
if cut
green.

§. 13. It is commonly said, that oats cut green will ripen lying in swarth. — If by ripening be meant shrinking,

shrinking, drying, or withering, I must allow the position; but if the country-man will have it that the greenish oat, cut a fortnight or ten days, or be it but a week, before it is ripe, will proceed in it's vegetable increase, and swell as well as harden by lying in swarth, I must deny it. — This year (1707) I made a full experiment of this matter; for when the spring-corn was sown, the ground being generally dry, half the oats and barley came not up till the latter end of May, when rain came, whereby in most places half the crop was edge-grown. — So, the forward oats being in danger in britting, we were forced to cut down the greenish corn with the ripe, when otherwise we should have waited ten days longer: I let them lie in swarth above a week, and, when I carted them, I found the hull of the greenish oat had got a riper colour, and the pith was well hardened, but pitifully lean and shrunk: so that, though this is to be done on necessity, yet it ought not to be practised with such indifferency as is usual among the farmers. — Note, the pith of these green oats was well past the milk, and come to a floury substance.

B U C K - W H E A T .

§. 1. ^a **M**R. Ray speaking of buck-wheat says, Of it's nature and use. there is no soil but what agrees with it; it loves moisture, comes up soon, and ripens in a short time. The grass of it, when green, serves to feed black cattle, and the seed itself when ripe is excellent for fattening poultry.

^a Nullum fere solum refugit: gaudet imbribus, cito provenit, celeriter maturefcit: herbam viridem, priusquam semen maturerit, boves, jumentaue pascuntur: semine gallinaceum genus pastum citissime pinguescit. fo. 182.

B E A N S,

Of the nature of the bean.

§. 1. ^b **C**olumella thinks that land is not much fructified by leguminous corn, but that they do not much damage the ground. lib. 8. fol. 103. And Palladius has a quotation from him, in which he says a lay-ground is better to sow corn on than a bean-stubble.

Observations in Somersetshire—when the bean-crop is best beans are dearest.

§. 2. I find it is an observation with Somersetshire-men, that when (as it proved this year, 1709) their beans are very good, they are with them very dear, and then wheat also is dear, because the wet springs, which make their beans good, hurt their wheat, and they find by experience that wet and cold springs in poorer and lighter lands runs the beans out into stalk beyond the staple, and then they never kid well, whereas, their deep rich grounds will support the bean under it's freest growth.

Beans not proper for the hill-country.

§. 3. I very much doubt whether horse-beans will ever ripen kindly in our hill-country of Hampshire; their pod is so very moist and thick, that, before it can be well dried by the sun, the cold days and dewy nights so increase the moisture, that the bean will rot before it can grow dry. — I the rather believe this, because I sowed garden-beans in February, but could never get those that I designed for seed to ripen.

Different sorts of land used for beans.

§. 4. About Bishop's-cannons, All-cannons, and Stanton they sow horse-beans in their common-fields without any laying the ground down to a sword, but about Holt they do not venture to sow ground

^b Palladius, fo. 114. De faba, dicit, satiatione ejus generis, sicut opinio habet, non facundatur terra, sed minus læditur. Nam Columella dicit, agrum frumentis utiliore præberi, qui anno superiore vacuus fuerit, quam qui calamos fabaceæ messis eduxit.

to beans, unless it has lain down two or three years to grass, and has got a sword: the reason the farmer there gives is, because the land about Holt is not so strong as about All-cannons, &c.

§. 5. After the fertility of wheat mentioned by Pliny, he says of the bean stalk, that one has been known to produce a hundred beans. *Inventus est jam et scapus unus centum fabis onustus.* Plin. lib. 18. fo. 277. Quantity of beans on a stalk.

§. 6. ' Mr Smith of Stanton says, horse-beans are abundantly a more certain grain than peas; that there Of the different kind of horse-beans, and their management.

' As Mr. Lisle has but few observations on the culture of horse-beans, and as Mr. Miller is more particular on that subject, I judge the following note, taken from that author, may be acceptable and useful to those, who are desirous of information in this part of husbandry.—“ The horse-bean delights in a strong moist soil, and an open exposure; for they never thrive well on dry warm land, or in small inclosures, where they are very subject to blight, and are frequently attacked by a black insect, which the farmers call the black dolphin: these insects are often in such quantities as to cover the stems of the beans entirely, especially all the upper part of them; and whenever this happens the beans seldom come to good; but in the open fields where the soil is strong, this rarely happens.— These beans are usually sown on land, which is fresh broken up, because they are of use to break and pulverize the ground, as also to destroy weeds, so that the land is rendered much better for corn, after a crop of beans, than it would have been before, especially if they are sown and managed according to the new husbandry, with a drill-plough and a horse-plough.—— The season for sowing beans is from the middle of February to the end of March, according to the nature of the soil; the strongest and wet land should always be last sown: the usual quantity of beans sown on an acre of land is about three bushels; but this is double the quantity that need be sown, especially according to the new husbandry: but I shall first set down the practice according to the old husbandry, and then give directions for their management according to the new.

The method of sowing is after the plough, in the bottom of the furrows, but then the furrows should not be more than five, or at most six inches deep. If the land is new broken up, it is usual to plough

there are three sorts, viz. the Somersetshire horse-beans, which are the largest, and a middle sort, and the least or smallest sort. — He says the largest sort are too big for his land, and that he chooses to sow the middle sort. — They never sow them, he says, till the middle of February, or the latter end; they sow five bushels on an acre, and are not in danger of rooks after they are come up; he cuts them a little before they are full ripe, otherwise in moving the ripest are apt to shed; that, take one time

plough it early in autumn, and let it lie in ridges till after Christmas; then plough it in small furrows, and lay the ground smooth: these two ploughings will break the ground fine enough for beans; and the third ploughing is to sow the beans, when the furrows should be made shallow as was before mentioned. Most people set their beans too close; for, as some lay the beans in the furrows after the plough, and others lay them before the plough, and plough them in, so, by both methods, the beans are set as close as the furrows are made, which is much too near; for, when they are on strong good land, they are generally drawn up to a very great height, and are not so apt to pod as when they have more room, and are of a lower growth; therefore I am convinced by some late trials, that the best way is to make the furrows two feet asunder or more, which will cause them to branch out into many stalks, and bear in greater plenty than when they are closer: by this method half the quantity of beans will be sufficient for an acre of land; and, by the sun and air being admitted between the rows, the beans will ripen much earlier, and more equally than in the common way. — What has been mentioned must be understood as relating to the old husbandry: but where beans are planted according to the new, the ground should be four times ploughed before the beans are set; which will break the clods, and render it much better for planting: then with a drill-plough, to which an hopper is fixed for setting the beans, the drills should be made at three feet asunder, and the spring of the hopper set so as to scatter the beans at three inches distance in the drills. By this method less than one bushel of seed will plant an acre of land. When the beans are up, if the ground is stirred between the rows with a horse-plough, it will destroy all the young weeds; and when the beans are advanced about three or four inches high, the ground should

time with another, he has double the crop of beans to what he has of peas ; and that he never plants them, because planted beans must be houghed, and where ground is apt to bind, and bake, the hough cannot easily enter to raise a grete, especially where the land is stony. — He assures me, that broad-clover will grow very well with beans ; and that he has often seen the experiment of it.

§. 7. When Pliny and the *Rei rusticæ scriptores* say, that the bean delights in much wet weather, --- it must be considered that they lived in Italy, a much hotter country than ours; for in England we

Of beans
loving
moist land,

should be again ploughed between the rows, and the earth laid up to the beans ; and if a third ploughing, at about five or six weeks after, is given, the ground will be kept clean from the weeds, and the beans will stalk out, and produce a much greater crop than in the common way. — When the beans are ripe, they are reaped with a hook, as is usually practised for peas ; and, after having lain a few days on the ground, they are turned ; and this must be repeated several times, until they are dry enough to stack : but the best method is to tie them up in small bundles, and set them upright ; for then they will not be in so much danger to suffer by wet, as when they lie on the ground ; and they will be more handy to carry to stack, than if they were loose. The common produce is from twenty to twenty-five bushels on an acre of land. — The beans should lie in the mow to sweat before they are threshed out ; for, as the halm is very large and succulent, so it is very apt to give, and grow moist ; but there is no danger of the beans receiving damage, if they are stacked tolerably dry, because the pods will preserve the beans from injury ; and they will be much easier to thresh after they have sweated in the mow than before ; and after they have once sweated, and are dry again, they never after give. By the new husbandry the produce has exceeded the old by more than ten bushels on an acre ; and, if the beans, which are cultivated in the common method, are observed, it will be found, that more than half their stems have no beans on them ; for, by standing close, they are drawn up very tall, so the tops of the stalks only produce, and all the lower part is naked ; whereas, in the new method, they bear almost to the ground ; and, as the joints of the stems are shorter, so the beans grow closer together on the stalks.

know

know that beans desire a moderate season : in hot summers, like this, anno 1707, their lower blossoms only kid, and in wet summers they do not blossom well.

P E A S.

Of the
growth
and blossoming
of peas.

§. I. **A** N N O 1708 ;—when the field and garden-peas this year were near a foot high, I observed on the very top of them a purse or nest of buds of blossoms, lying in a bag together ; and observing farther that there was no show of blossoms putting forth at the lower joints, I concluded our crops of peas would this year miscarry, and that we should only have some top-kids, all expectation of the lower kids being vain, because the kids on the lower joints are always forwarder in blossoming and kidding than the upper, or top joints, and, as I said before, there was no appearance of blossoms in any of the lower gradus of joints: this afforded me some amusements in reasoning, but, not being satisfied, in a day or two after I looked into these upper pods or bags of blossoms again, and dissected them ; wherein I found sometimes near thirty blossom-buds, two or three of which usually seemed to have got the start of the rest, and to be bigger in bulk, and higher in stature ; most of the rest seemed to lie in a huddle, without making any gradations ; but as I never had seen, unless in the crown-pea, (which carries all it's blossoms in a tuft at top, like a nosegay) other peas put forth above two blossoms and kids at top, which seldom come to good, so I suspected in this pod, there being so many blossoms in it, that they must form the successive gradations of blossoming-joints, which did arise from that stock as from a common root, and so that

that every blossom in order, as it grew forwarder than the rest, did shoot forth, above which the main stem still advancing made the blossom left behind the subaltern blossom of a lower joint; to try which I tied scarlet threads just under so many of the said pods, that I might know them again, and according to expectation, I found in four or five days time that I had several gradus of blossoms, arising from joints with lobous leaves above my scarlet threads, and the pod of blossoms still advanced on to the end, leaving behind farther joints of blossoms till the whole stock was spent.

This observation was very pleasing to me, as being obviously fruitful of many corollaries, which I shall set down in order.

Inferences
from the
foregoing
observa-
tion.

(1.) By looking into this pod, or purse of buds, while as yet it is so in it's infancy as only to be viewed by a magnifying glass, we may judge what hopes there are of a future crop, provided the succeeding months prove seasonable.

(2.) We may learn from hence what sort of peas to adapt to every sort of ground;—but, before I enter on that part and use of the abovementioned observation, I must, for the better understanding thereof, premise, that the farmers vary in their judgment in no one point so much as in the nature of the pea: it is a common thing in the same parish to have many sorts of peas sown; and the persons respectively shall every one have a great prejudice to any other sort of pea, but what they sow, having, it is likely, been disappointed of the return other peas made, when they sowed them, and it is likely may soon grow out of opinion of the pea they have made choice of, from the great uncertainty of the produce of a pea-crop; so that the pea, in the countryman's understanding, has got the character of a very * kittle grain.

subject
to acci-
dents--un-
But certain.

But if the farmer would consider, from the foregoing observation, how early or rath-ripe a pea is, or how late in ripening in it's nature; and that (seeing all it's stock or posse to put forth blossoms lies within the foliage of one pod) the art must result from thence, so to sow the peas, in such ground, and at such time, that each sort of pea, according to it's nature, may have time before autumn and cold weather come to check them, to send forth all the gradations of joints or blossoms, that none may become abortive, for want of summer enough for nature to bring forth her embrio's to maturity, and finish the bud-blossoms into kids.—If so, then it is apparent (as all great peas are late ripe, and run to a great halm or stalk, and the smaller the pea is, the earlier ripe, and of smaller halm) that the great or late-ripe peas should be sowed as early as the clime you live in will permit; for thereby such pea will get so forward as to have time to exert all it's gradations of kids and blossoms, and to have them perfected before rainy autumn comes, and puts a stop to farther vegetation.—Again, such great pea ought to be sowed on a white, or some mixt land, not too gross of juice, but not on a cold clay; for such moisture will keep feeding the halm, and be inconsistent with the first design of sowing them early, that you might have all the blossoms ripen, seeing such land will retard it's progression to such maturity; but the said white, or mixt mold must be in good heart, otherwise it cannot maintain a great pea; so, vice versa, it is from hence apparent that a rath-ripe pea should be sowed in a strong feeding land, because such land will maintain the pea more vigorously, and that there is no fear of it's halm growing too gross, it being naturally short, and, notwithstanding the coldness of the soil, there will be no doubt but the kids will all ripen.

§. 2. There

§. 2. There are a great many sorts of field-peas, ^{What sorts of ground suit different sorts of peas.} whereby the country people are puzzled, and are governed by humour in their choice for sowing, and make great distinctions between the sorts to be ranged under the same class, from their good or bad luck, or good or bad judgment in managing their ground ; infomuch that a neighbouring farmer on the same situation of soil with another, shall be out of patience to hear such sorts of peas commended by his neighbour, with which he has had ill success. — The sorts of field-peas then I take to be ranged under two heads, viz. the tender and the hardy small sort, and the tender and the hardy great sort, not doubting but all sorts of peas, to be ranged under either of these classes, will equally agree or disagree with the same soil : the tender pea is improper for a cold country, or for cold ground in a warm country, which amounts to the same thing ; the great pea, by reason of it's great halm, is not proper for a strong and fat ground, for the halm will increase to so great a length as not to bear kids. I am satisfied from my peas this year (1704) sown on strong cold ground and peas-stubble, and others sown on barley-stubble, that to lay peas on a mellow light mold, made so by ploughing, is much the best way to bring along, and make a full-kidded pea ; for the latter, tho' not on so good ground, had both those advantages of the former.

§. 3. Mr. Raymond, who lives near Patney in Wiltshire, says, in those parts they had used to sow ^{Of the hotspur pea.} hotspur-peas in their fields, but that now (anno 1708) they grew weary of it. — I asked him the reason ; he said, those peas did not run out to so long and leafy a halm, nor lie long enough on the ground to improve and mellow it, but the other peas did much better.

§. 4. Farmer

Of the Cot-
shill pea.

• uncer-
tain.

§. 4. Farmer Elton, Mr. Edwards, and I fell in-
to discourse about peas ; it was anno 1700.—They
agreed that Cotshill-peas were about twenty years
ago the only peas sowed in this country, i. e. in
Hampshire ; they are a very large pea, near as big
as a horse-bean ; they grow exceeding rank, and
kid wonderfully in a year that they take in, but are
a more * kittle grain than the partridge-peas : they
must be sowed early, and run out so rank that they
are late ripe, and therefore subject to blights : the
farmer used to sow them in the middle or latter end
of February, and to take a very dry time for it ; no
matter if snow should fall afterward, he has had three
quarters on an acre ; but they both agreed, that of
late years the partridge-pea has been more in esteem ;
it is so called from it's reddish speckles ; it is a more
certain grain, and earlier ripe, and so less subject to
blights than the Cotshill-pea, which is nevertheless
the better pea to fat hogs with, because they will not
be so apt to swallow them whole.

Farmer Crapp, and farmer Biggs say, the Cot-
shill-pea does not well in the hill-country of Hamp-
shire, because the country is cold, and the halm of
that pea runs so large, and to such exuberancy of
juice, especially if the field lies to the north, that
the sun cannot ripen it, nor dry it, and check it ;
so that, especially in a moist summer, it will keep on
blowing, but not kid well.—I take this to be true,
and yet very reconcileable with what is said in ano-
ther place of the great increase of the Cotshill-pea in
a certain field, for that is not a feeding cold clay-
ground, but lies warm : on the other hand, why the
farmers should say, that the small partridge-pea re-
quired the best land and the Cotshill-pea the poorest,
is easily reconcileable ; — for the good land in the
hill-country is generally the strong clay, but the
halm of that partridge-pea will not run out so rank
that

that the sun cannot check and dry it. Again; the mixt sort of earth, running to a whiteness, is generally poorer than the strong clay, yet is not in truth poor, for where the Cotshill-pea thrives there must be good strength in the ground, to maintain such a halm.

§. 5. Mr. Randolph of Woolly, who has been a great sower of all sorts of peas, gives it me for a certain rule, that all white-blossomed peas, whilst green in the kid, will boil green, and all blue or red-blossomed peas, whilst green in the kid, will boil russet-coloured.

Of white
and blue
and red
blossomed
peas in
boiling.

§. 6. Regard is to be had in sowing great partridge-peas under furrow (where the ground is subject to run to grafs, or is knotted with grafs that is pretty thick set on the ground) to what may happen to them in case of a wet summer; as for instance, if in ground that has born broad-clover for one summer you sow peas under furrow the following February; for though perhaps such ground may break pretty well in ploughing, so as for the peas to come through, yet in case there should come a cold and wet spring, and a wet summer, the grafs will, long before harvest, so grow through the peas, after they begin first to fall, and at last so to over-top them, that you will be amazed, when you come to stack them at harvest, to see perhaps what was a very promising crop of peas in May and June so devoured by grafs, that the very halm as well as the kids shall seem withered away, and almost blighted to nothing.

Of par-
tridge-
peas.

If ground be apt to run to grafs; or be knotted with grafs before it is ploughed, and be sowed to peas on one earth, if a very wet summer should come the peas will be over-run, and eat up with grafs; to prevent which, and to fence against this inconvenience in wet summers, if the peas are sowed on one earth, the ground must either be knot-fine, or else be fallowed to kill the grafs, and sowed on the second earth.

Of the
blue pea.

• earlier
ripe.

The Bur-
bage grey,
or popling-
pea.

Peas love a
dry and
healthy
soil.

§. 7. The blue peas, with us, run much larger than the small partridge-peas, and consequently fill the bushel better : they kid, as I have observed, better than the other, and are a * rather sort, and will therefore bear sowing the later, as about the beginning of April, when the inclemency of the air is over ; and being to be cut greenish, they may be stacked the earlier, which are good properties in our cold hill-country.

§. 8. The Burbage-grey or popling-pea is much sowed in the deep lands of Somersetshire, and called there, the clay-pea.

§. 9. I find by all the judicious farmers I can converse with, that, though peas will not grow on poor light land, but require some depth of soil and strength, yet at the same time peas will not thrive well in a cold wet clay-land, but love a dry healthy soil.

I observe about Holt in Wiltshire, where the land is generally wetter than at Crux-Easton, that they lay up the pea-lands in small round furrows, and they sow the great partridge-pea under furrow, if they can have a season as early as Paul's-tide, i. e. the 25th of January ; and the reason they give for it is, because being sown so early they would lie too cold, if they laid the lands flat.—Though I lie not so wet, yet, my clay-lands being cold, I am of opinion that I ought to imitate this husbandry, when I sow peas early.—The coldness of the situation of Crux-Easton is also a farther reason for so doing, because the cold air will not have so much power of chilling the earth, when laid in this manner dry, as it will have when lands hold wet by lying flat ; for earth will not freeze, nor receive any impression from cold, but on account of it's moisture, in which the more it abounds the colder it will be, according to the degree of the coldness of the air.—In Wiltshire, if the land breaks tolerably rotten or mellow, they omit a tining with

with the harrows, which would also be the best way in our cold country.

§. 10. A farmer in my neighbourhood having most excellent boiling-peas, which they call green-peas, I proposed to sow of them on a lay-ground I had grubbed; but the farmer forbid it, and said, if they were sown on lay-land, they would run to halm, and not kid: light barley-ersh, he said, was best for them, and that, if they hit, they were mighty increasers; that they must be sown about the beginning of April, and they yielded as good money, and as certain as any corn, but they were a ticklish grain.

§. 11. The country-people say, peas do best on a barley-ersh; the reason of which must be, because how much finer the ground works so much the more does the earth, every part of it being opened, communicate of it's goodness to the peas-halm, which being gross requires good nutriment to feed it; and where the ground lies lightest, provided it be not thereby liable to the evil on the other hand of burning, there the rain will wash the goodness of the land to the roots of the corn, and feed it; and I do believe the sun in summer prepares the thin topmost crust of the earth with rich spirits, which, when washed into the earth, must fructify plants.

The only reason I can give why peas should thrive so well on barley-ersh, (tho' possibly the land may be much poorer than lay-ground) is, because barley-land has for the most part been mellowed by a wheat-crop the year before, and also fallowed, if not thwarted the barley-year: the ground for these reasons is very mellow and light, and easily admits the rays of the sun, the rain, and the dew, to penetrate to the roots of the peas; whereas the grossness of the peas-halm so over-shadows the ground from

those three powers, that, where the ground lies more close and hard, those powers are not so accessible to the roots of the peas; for this reason it follows, that land, if not of a very light nature, is to be fallowed and thwarted for peas: peas ought also to be sowed early in the year, that they may ripen between sun and sun; the grossness of the halm so much resisting the powers of the sun, and obscuring him when he grows weak, that the peas cannot ripen in good time, and, if the ground lies not mellow and warm, they run out to halm and do not kid well; for the juices of the ground ought to be well digested also, to be fit to make flowers come in the joints of the peas-halm, in order for blossoms: besides, the earlier you sow your peas, the more hopes you have of the blossoms in the upper joints coming to perfection, which by their backwardness are generally lost; and if these upper kids can get forwarder than the coming of the locusts or green louse, so as to be too hard for their teeth, they will (by being earlier sowed) escape all that damage; and note, as it is in the green herb, so the early coming of all insects depends on the clime, and the nature of the soil, be it cold or hot, if the insects are such whose seeds are laid in the earth.

* Pliny, speaking of the bean, says, in some of the northern islands and in Mauritania it comes up of it's own accord, and without tillage, but that it is of a wild sort, very hard, and unfit for boiling.—I note this, because it's seed sowing itself falls on untilled ground, and therefore boils hard; for we observe in peas, that the more mellow the ground is,

* *Nascitur et suâ sponte plerisque in locis, sicut septentrionalis oceani insulis, quas ob id nostri fabarias appellant, item in Mauritaniâ, silvestris passim, sed prædura, et quæ percoqui non possit. Plin. lib. 18. fo. 283.*

the

the better they boil, therefore boil well from barley-erfhes.

Farmer Biggs observed to me, that laſt year (1702) he had the experience of ſowing peas after barley, in a ground where peas had been ſown the year before the barley, and that, though it was in a bottom, yet he had poor halm, and poor kids, whereas on two or three lands adjoining, and much poorer land, where peas had not been ſown ſome years before, he had a very good crop of peas.

§. 12. Mr. Raymond ſays, he has always obſerved, that land, which has carried peas one year, will not be fit for them again in ſix years time: if you ſow them ſooner, they may poſſibly run to halm, but will not kid ſo well, and ſo, ſaid he, our neighbouring farmers have obſerved. — I ſuppoſe white or light land, being much the ſooner robbed of all the ſpecifick nutriment of the grain by the crop of the ſame grain it carried laſt, cannot be ſo often renewed to peas as clay-land may, and the oftener the land is dunged the ſooner it will recover, I judge, that ſpecifick nutriment adapted to each grain.

Land ſow-
ed to peas
will not
bear peas
well again
for ſix
years.

§. 13. Peas, of all ſorts of grain, degenerate ſoonest, at leaſt in two or three years, be the land ever ſo good. Evelyn, fo. 324.

Peas dege-
nerate.

§. 14. The honey-comb or pitted-pea ought not to be ſown on the hills in Hampſhire, for ſuch a pea is a cold pea, as not being fully ripened, but ſhrunk, and will not grow well in cold ground.

The honey-
comb or
pitted pea.

§. 15. It is ſaid hop-clover ought never to be ſowed with peas; they'll cover the clover ſo as to kill it; peas will kill the very weeds, and that is one of the reaſons why peas prepare the ground for barley.

Hop-clover
not to be
ſowed with
peas.

But farmer Biggs asked me why I had not ſowed a certain field, ſown to peas, to hop, or broad-clover; and on my answering that I doubted whether

the peas might not have killed it;—he replied, there was no fear of peas hurting it, where the ground was not rank,—and so I found; for at the lower end of the field, where the farmer sowed his goar-vetches, I sowed hop-clover, and it came up as well as any where.

Of the blue vapour on peas, and of the weather that best suits them at blossoming time.

§. 16. I observed the green halm and leaf of my peas sown on a summer-fallow carried a strong deep green, and had a blue vapour on the halm and leaf, like the blue steam on plumbs, which accompanied them to their flowering; but on peas less in proof, the leaf is of a paler green, and has less of that blue vapour.—I take this blue vapour to be an exsudation from the plant, and is the effect of a good insensible perspiration, and denotes health in the plant, and such plumbs and corn as have least of it are less in proof. — This blue exsudation goes off the leaves and stalk a little before blossoming-time, and then they grow paler.—We had a cold cloudy dripping season during the blossoming-time of these peas (anno 1715) and it was very observable to me, that both my sorts of peas (of which I had an hundred acres, great grey partridge-peas, and blue popling-peas) blossomed very blindish, as peas will do in hot scorching dry weather at the blossoming-season; so that I fully concluded that neither of the extremes, either of wet or drought, were so agreeable to peas as moderate rain with heat at their blossoming-season; but the continuance of many days cold rain must be prejudicial;—yet whether the hot burning dry weather be not worse than the other is a question.

To turn the wadds in rainy weather after hacking the peas to prevent britting.

§. 17. If it be a dripping and rainy harvest, in the pea-season, between the showers, when the upper part is dry, tho' the rain may have wet the ground through the wadds, to turn the wadds of peas will save the kids from britting and shedding; for

for nothing makes peas more subject to open the kids than lying fogging in the wet; therefore, in hacking them, to make the wadds small, is a preservative, if the weather be showery, against their britting, because the smaller the wadds are the sooner they dry.—Of this I was very sensible this harvest (anno 1707) it being very showery; for the Newbury-men's wadds being hacked large, britted much, when our people's lesser wadds suffered no damage: add to this, that the smaller the wadds the sooner will the peas be fit for carting, whereby a day gained often saves a whole crop from damage.

§. 18. When peas are well blossomed, there are two blossoms that divide themselves in forked-foot stalks on every stem; whereas many years there is but one blossom on each stem.

§. 19. Monsieur de Quinteny says, fo. 156. — That the blossoms of peas commonly spring out from the middle of the fifth or sixth leaf, from whence there springs an arm or branch, that grows exceeding long, and produces at each leaf a couple of blossoms like the first. — On reading this I went and viewed my peas, in a field where they were extraordinary good; — I found for the most part that no blossoms appeared till, reckoning upwards, you came to the sixth or seventh leaf, but where the peahalm seemed not to be in good heart, no blossom appeared till you came to the eighth or ninth leaf, nor could I in any of the field-peas find any collateral bearing branch to issue out, as described by Monsieur Quinteny, but I did observe such a branch to issue out in my hotspur garden-peas.

§. 20. The top-blossoms of peas bring forth but a small blighted kid, and hang late on the halm before they kid at all, so that they seldom come to good; — but in my vetches I observed many collateral tillows on the stalks, even from the root upwards. so that there were commonly five or six

Mark of
peas being
well blossomed.

Mr. Quinteny's observation on peas blossoming not true in field-peas.

Vetches greater increasers than peas, and of the fly that breeds in them.

collateral branches arising, one above another, in two or three joints on a stalk, — I also observed a downy cotton bud to arise from the second and third joint, just above the leaf, and so for the most part all along, where there were no kids: this bud, though but small, seemed to me to be a bud designed for a flower, but miscarried by the unhappy season of the year. So I infer from hence, that vetches, where they hit, are much greater increasers than peas. — Whereas I was of opinion, that the miscarriage both of peas and vetches happened from the eggs of flies laid in the upper pod of each, I am now of the contrary way of thinking, viz. that the miscarriage of the crop, both in peas and vetches, is in their lower blossoms, which ought therefore to be earlier looked into, it being of no great consequence how the upper pods are destroyed, because the kids never come to perfection: nevertheless it is not unlikely but the maggot bred in the upper pods, whether by flies or eggs, or not, may travel downwards, and eat up the lower kids and leaves.

More on
Mr. Quinteny's
observation.

§. 21. It is said by Quinteny, (as before cited) that peas commonly blossom at the fifth or sixth leaf; which is, as I suppose, in dry and hot summers, when the halm is checked from running too gross, and to so many joints; but, when in a wet year the halm runs out to a great length, the stalk at the fifth, sixth, or seventh leaf, is so gross and overshadowed by the other leaves, that the juice is not concocted enough till it has advanced more into the sun, so as to emit the blossoms. — And it stands to reason, that peas set on sticks should kid better than those that lie all along, — and the well blossoming of beans seem to depend on the same reason, therefore field-peas when sowed thick do the better uphold themselves by their strings, to let in the sun and air, till they fall by the weight of their kids.

§. 22. It

§. 22. It is observed both in Hampshire and Wiltshire, that peas never kid well that year, in which they blow blind, that is, when their blossoms open not full, as it happened anno 1705—a wonderful dry summer.

If the blossoms open not full, it is a bad sign.

§. 23. When I was at Holt anno 1712—I observed in the peas, while blossoming, that where there was but one single blossom on a foot-stalk, there generally grew up a little spur, near an inch behind the blossom, on the same stalk, in height about the length of a barley-corn. I suspected that another blossom had grown thereon, and that the clasps of the peas had taken hold of it, and pulled it off by the power of the wind, or that some other accident had destroyed the blossom; but at this time looking a little nicer into the matter, I laid open some cases, wherein the blossoms unblown lay in a cluster, as in a purse, and there I observed, that generally to the foot-stalks of the single blossoms there also grew a spur; only here the spur was very small and short, not of half a barley-corn's length, and very tender; these spurs advance in stature and substance as the contiguous blossom grows, and by that time the kid grows full, it will be as long as two or three barley-corns, and of strength proportionable, like a pea's-stalk: so that one might well suppose a pod had grown on it, and been pulled off by some violence, but doubtless it is an effort in nature towards producing a blossom, since it is seated in the very place where a blossom grows, whenever the foot-stalk carries a double blossom; and I presume in rich land, and a hotter country, there rarely fails being two blossoms on every foot-stalk.

Of the spur at the end of one of the stalks of the pea.

§. 24. I have observed, when ground is in good heart, and rain falls seasonably to feed the peas, that their blossoms blow strong (as before taken notice of); and further here I add, that the two outermost and larger

The leaves of the blossoms turning back a good sign.

larger leaves of the blossoms, which look like hoods, expand themselves in so strutting a manner as to bend backwards; when they do so, it is a sure sign of vigour; from such blossoms there will certainly come a noble kid; whereas, when the blossoms blow blind or faint, some of them fall off, or tho' they should be strong enough to produce a kid, 'tis commonly but a poor one, and often of a ram's-horn figure;— and it may often be seen, that, when the first blossoms blow vigorously, in a hot dry summer, (but to effect this, there must be good heart in the ground too) if the dry weather continues, the latter blossoms shall blow very sickly, and make but starved kids, and many of the buds will want strength to put forth a blossom, and wither; yet if a lucky rain comes in time, it will save them, and so strengthen them, that they'll go on blowing with a lively colour.

Sensation
of plants,
particular-
ly peas.

§. 25. By the expansion or contraction of the leaves of peas the degrees of the cold nights may be seen; their flowers also, if put into warm water, will in an instant open; which shews the wonderful consent of parts, and communication of particles in some plants, analogous to the spirits of men, by which there is such a quick sensation through the nerves.

Peas not so
well ripen-
ed nor so
hard in the
hill-coun-
try as in
vale.

§. 26. This year (1716) I housed my peas, as I thought, in excellent order, they having taken no rain, and being thoroughly ripe; yet, when carried to market, they were softer than other peas, nor would they rattle when handled in the sacks like some others.— The reason of which must be, that in our hill-country the weather towards autumn is not hot enough to push them on to that thorough ripeness as in the vale, and as they must lie some few days in the field, after they are cut, to be thorough dry and hardened, so our days are cooler, and our nights both cooler and more dewy than in the vale, and therefore our peas are not dried to so great a degree

gree of hardness as theirs; and this difference (*cæteris partibus*) holds good in other corn between the hill-country and the vale.

§. 27. In Leicestershire they set all their peas abroad in stacks, and house none, because (as they say) setting them abroad gives them a good colour, whereas laying them up in a barn makes them look dark. Custom in Leicestershire.

V E • T C H E S.

§. 1.^a **A**ccording to Columella, if, when you cut up vetches and lupines green for food, you leave the roots to grow dry in the ground, they will impoverish, and take away all it's strength; and he says, it is the same of beans. Opinion of the anti-ents concerning vetches.

§. 2. Farmer Biggs said, vetches were the most profitable grain that could be sowed; that a load of them would go farther than two load of hay; he said farther, if they were sowed on land somewhat light, where they would not run up very rank, they were excellent for sheep, being reaped a little earlier than they are for the horses, and when dried the sheep would eat up every little bit of stalk.—Thomas Elton said, vetches were the most profitable grain that could be sowed, but he held that goar-vetches were apt to scour too much, especially if the weather was wet and cold.—Farmer Lake and farmer Bond agreed, that goar-vetches were best for horses when they were just in kid, but earlier than that, especially in cold and wet weather, they were too gross, and not so hearty. Opinion of various farmers of the profit from vetches.

§. 3. I was telling the abovementioned farmers, that some of my vetches seemed to be uncovered, Vetches will grow even without har-

* Si lupini et vicæ radices defecto pabulo relictæ inaruerint, succum omnem solo auferunt, vimque terræ absumunt, quod etiam in faba accidit. Columella, lib. 2. cap. 14. Pallad. ad idem, lib. 1. sect. 6.

and

and not to have been harrowed enough. — They said, if vermin did not meet with them, vetches would work themselves into the ground, and that they had sown them when so much rain followed that they could not harrow, and yet had as good a crop of vetches as at other times.

Vetches
improve
strong red
clay-land.

§. 4. I had a very fine crop of vetches in a falling white land, of about three loads upon an acre, yet the succeeding crop of barley was but ordinary; and indeed it seems to stand to reason, that a good crop of vetches is only a considerable improver of strong, or red clay-land; for in such land they do not only run ranker, whereby the halm betters it, but it also mellows such land, which is very material towards a barley crop; whereas in poor white land, tho' the vetches may kid well, yet they seldom run to a good halm; nor is it material for white land to be hollowed and made light by the vetches, it's heaviness being no defect before; therefore I hold, that, tho' a good crop of vetches be on a white and poor land, yet it is not a soil to be depended on, without folding, toward a barley-crop.

White land
bad for
vetches.

§. 5. I sowed winter-vetches (anno 1703) on poor white land, and had but eleven load of vetches off seventeen acres, beside the tythe, and yet it was a very wet dripping summer, which favoured their growth extreamly; otherwise there might not have been two load on the seventeen acres: this ought to be a caution not to sow vetches on poor white land.

Not to crop
vetches.

§. 6. Wheat will endure the winter better than winter-vetches; for, if wheat loses it's top by the cold, it will grow again, but if vetches are crompt, though they come to halm, they'll neither blossom nor kid. — It is the same with peas as with vetches, if they are bit; — and if they kid not tolerably, the best way is to give them to the horses.

§. 7. By

§. 7. By sowing a good quantity of winter-vetches there are several advantages, the least of which, ^{Of the great profit of winter vetches.} and the most obvious, is to render the ground fit for a barley-tilt, and so knot-fine as to be capable (after it has been, if you please, winter-folded, as an additional richness) of being ploughed up and sown on one earth. — And if the summer be wet, so as the meadows afford grass enough for hay, and the year is not encouraging, thro' frequent rains, to cut the vetches for dry fodder, and make them into hay, the seed however (preserved for sowing) is profitable. — But the greatest benefit arising from vetches (in case the summer be burning-hot, so as the meadows afford little hay) is that in such time the vetches cut, when the flowering is just over, or when the pods are half full with seed, are of great use to supply the defect of hay, and make the nobler fodder for the year's being scorching; for at such times the vetches are not apt to run to such lengths as to rot on the ground, and you have commonly a good season for making them into hay, and by cutting them thus early for fodder, viz. by about the 20th of June, you may hope to have ploughed up the ground again by the beginning of July, and sown thereon a crop of turnips.

§. 8. It is admitted by all knowing persons in husbandry, that a good crop of winter-vetches enriches land more, and prepares it better for a crop of barley than a crop of peas does. — One reason of this may be, because a crop of winter-vetches covers the ground longer than peas do. — But another reason seems probable to me, because honey-dews are bred and generated in great quantities in the joints of the stalks of winter-vetches, and in the foldings of their leaves (which increase the bud of the blossoms) partly by the exterior dews, partly by the exudations therewith mixing, being condensed by the heat of the sun, and boiled into a syrup, which contains

^{Winter-vetches prepare the ground for a barley-crop, and why.}

tains fixed salts, and are afterwards by great rains washed off the vetches, and carried into the earth, to it's great enrichment.

Good after
a barley-
crop.

§. 9. It is the general opinion of farmers I have talked with on this subject, that winter-vetches always do best after a barley-crop: I have tried them after oats with good success.

Better af-
ter other
corn than
on a lay-
ground if
sowed to
one earth.

§. 10. I have found by experience, that if winter-vetches are sowed on one earth, and on lay-ground, though clay-ground that turns up pretty mellow and rotten, yet they will, if a hot summer comes, be more apt to blight than winter-vetches sowed on a clay-ground, which breaks small, after two or three former crops have been taken from it: such ground closes better to the roots.

A wet
spring
makes vet-
ches dear.

§. 11. Farmer William Sartain of Broughton in Wilts says, the rule in the vale for spring-vetches being dear is, when there is a wet spring, when, if the barley-land does not work well for a barley-crop, they like to fling in a crop of spring-vetches in order for a winter-crop of wheat at Michaelmas; and from this principle a wet spring has occasioned such a demand for spring-vetches that he has, in such case, sold them for seven shillings a bushel.

Dry sum-
mers the
same.

§. 12. As the driest summers make feed-vetches dear at Michaelmas, so they are more so in case of a bad summer for sown grasses, that is, in case the spring of the foregoing year was so dry that the sown grass-seeds did not come up well; for then, in the hill-country, the scarcity of grass, made more scarce by a hot summer, must occasion the scarcity of vetches.

Caution—
to sow them
if oats be
dear.

§. 13. If a husbandman finds by the course of the winter that oats are dear, and like to be dearer in summer, he is not wise, who takes not care to sow a good quantity of goar-vetches in the spring, especially if they are cheap.

§. 14. Vicia

§. 14. *Vicia multiflora*, apud Ray, vol. 1. fol. 903. — Anglice tufted-vetches. — Mr. Bobart of Oxford assures me, that wheresoever this vetch grows in the meadows, it is a sign of the land being very rich. Tufted-vetches a sign of rich land.

§. 15. I have sometimes known many quarters of goar-vetches sowed only to the intent of ploughing them in : the best way is first to roll them, before you plough them, or else you could not make good work, that is to say, the way is to roll one land upwards, and the other land downwards, that so the plough need never to go against the grain, the vetches being first laid flat before the plough in the rolling. Of ploughing in vetches. Vid. sowing vetches.

I spoke to Mr. Bishop of Dorsetshire of the husbandry of sowing goar or summer-vetches, and ploughing them in instead of dunging. — He commended the way very much, and said, in many countries, where they had more arable than they could dung, they had no way better than so to manage it ; but doubtless the winter-vetches are more advantageous for that purpose, because the summer-vetches would come up so late, that they could not plough it up again early enough to summer-fallow it, whereas the winter-vetches would come up so early, that the cattle might feed them down, and they would afterwards be got up high enough to be ploughed in, — but this husbandry is for deep land ; for in light land upon a rock, where the rock is but four inches beneath the surface of the land, the vetches so sown would never come up.

If any think fit to sow vetches for ploughing in under the furrow, in order to improve the land, I think it easy to prove, that winter-vetches are properer for that purpose than goar or summer-vetches are ; for though goar-vetches run much grosser, and in that respect would be better ; yet, in regard they are

are tender, and will not endure being sowed till spring, they cannot get to a sufficient growth for ploughing in till towards August, by which time the vigour of the sun, which should precipitate their putrifaction by raising noble salts from them, will be so much abated that little can be effected that way; whereas winter-vetches being sowed before winter, and having a root confirmed before spring to proceed on, will be forward enough to be ploughed in by a week or a fortnight in June; and the quantity of their salts, lying so much more under the power of the sun to extract them, will amply compensate the ground for want of the larger halm.

^b The antients practised this husbandry of ploughing in winter-vetches, esteeming it equal to a coat of dung, as we learn from Columella.

Observation on the growth and blossoming of vetches.

§. 16. I took a view of my vetches in blossom to see in what different manner they blossomed from my peas (taken notice of before); and I found, that whereas good peas, that blow well, have two blossoms on the same stalk, on divided pedestals; so, good vetches have two blossoms growing close to the stalk at every joint.— I observed under the uppermost tuft of blossoms in some of the vetch-halm two blossoms at every joint of the four upper joints, and at some of the five upper joints; then three or

^b Vice fimi lupinum certe præsidium expeditissimum est, quod cum exili loco circa idus Septembris sparserit, et inaraverit, (which is sowing under furrow) idque tempestive vomere vel ligone succiderit, vim optime stercorationis exhibebit; succidi autem lupinum sabulosis locis oportet cum secundum florem, rubricos cum tertiam egerit: illic, dum tenerum est, convertitur, ut celeriter ipsum putrescat, permisceaturque gracili solo; hic jam robustius, quod solidiores glebas diutius sustineat, et suspendat, ut eæ solibus æstivis vaporatæ resolvantur. Columella, fol 109 — But it seems that advantage cannot be made of the lupine-vetch in England; because it will die if sowed before winter; and if sowed in the spring, it will not be forward enough to answer these ends.

four

four lower joints had but one a-piece, and the halm carried four or five joints lower, on each of which there were very small woolly buds, but such as might blow afterwards, if the weather proved favourable. — From whence I infer, that, if vetches have their complement of joints, they amount to fifteen, and, if they carry their complement of blossoms, there are two at each joint ; I observed no more on any joint, and much of the halm had two blossoms only on the two upper joints, and but one on the joints beneath, and possibly left off blossoming at the fifth joint : again I observed, that many seventh and eighth joints carried two blossoms, when the uppermost had but one blossom on each, and I found many of the fallen or falling-off blossoms of the lower joints blighted. Note, this was but in white land. — In another field of vetches I afterwards observed but four or five joints in a halm, and but one or two of the uppermost joints to have two blossoms.

It was this year (1712) observed by many farmers that the vetches kidded at the top and not at the bottom, that is, they run on, and spent many more joints than usual without putting forth either blossom or kid : — I thought the peas also did the same. — I am at a loss how to assign the reason why vetches and peas should some years run out into kid at the lower joints first, and other years leave many lower joints unfruitful ; unless it be, that the blossoms being all formed in a cluster, as before described, the clusters in wet years run on so fast and furiously into joints, that they pass on too quick to make a due formation of the lowermost blossoms ; by which means the unformed bud of the blossom, which nature designed for fruit, is converted into a false birth, and an imperfect essay ; and so the same evil happens from blossom to blossom, and makes it late before this fury of the sap is spent, and fruit-

ful blossoms perfected. ——— Again, — when a very dry spring happens, as this year it did during the three latter weeks of April, and the whole month of May; it seems to me, that the buds of the lowermost blossoms of the cluster, which doubtless are first formed in embrio, are starved through drought; and so the joints, on which they should have grown, are left naked; but by the coming of more favourable weather the upper joints prove fruitful; so that a due medium in the temperature of the year between drought and wet seems to me to be the most fruitful season. ——— Again, — I have observed, when two or three joints have blossomed and kidded, and more blossoms, perhaps two or three gradations, remained unkidded, the season of the year being early enough, and the weather at that time being warm enough to finish them into kids; yet, if a season of cold rain then came, those blossoms would not produce kids, because as it seems to me, a good medium or temperature of the air is necessary for that purpose, in order to digest the juices, which are chilled by cold rain, and dried up by hot burning weather.

Of frost
ripening
goar-vet-
ches.

§. 17. Walking with a farmer in some goar-vetches in September (1700) they seemed very backward, whereupon I asked him if he thought they would ever ripen for seed; he replied, when the frosts came they would ripen; — by which he meant, that till then (the sun now declining in it's strength, and there being great dews and long nights) the halm would keep feeding on; but when the frosts came and checked the gross nourishing of it, then the kids would fill better.

Vetches,
when
blighted,
not so apt
to open
and shed.

§. 18. I was questioning whether some winter-vetches cut for seed should not be brought in, lest rain should fall and make the kids open, many of them being dead-ripe; — but the farmers said, no

fear

fear of that, for tho' they might seem to be dead-ripe, yet they were also blighted, which is apparent by the smallness of the grain (and such I observed them to be) and therefore their kids will be tough, and not so apt to open as at another time, when of the same ripeness.

§. 19. After all that has been said of the great Profit of profit arising from vetches, yet, if we compare it vetches and broad-clover compared. with that arising from broad-clover, we shall find the advantage on the side of the latter, viz.

Vetches	{ Sowing an acre of vetches at two bushels		
	per acre, and two shillings and six-		
	pence per bushel ——— 0 5 0		
	{ Ploughing and harrowing an acre 0 6 0		
	{ Hacking or mowing ——— 0 2 6		
	{ Total ——— 0 13 6		

Broad-clover	{ Sowing twelve pound on an acre, at		
	3 d. per pound ——— 0 3 0		
	{ Mowing an acre ——— 0 1 0		
	{ Total ——— 0 4 0		

The difference in favour of broad-clover is — — 0 9 6

The labour of carting, reeking, thatching, and sowing are the same; but, if you buy the seed of each at market, the vetches are in carriage vastly greater than the clover; for a load of vetches, reckoning five quarters to a load, will sow but twenty acres, whereas a sack of clover will hold two hundred and fifty pounds, which will sow more than twenty acres. Again, the second year's crop of clover, (if you let it grow the second year) is a very great profit beyond the rent of the ground; — so that there is no reason to sow winter-vetches in any ground that will well

REAPING and MOWING.

bear broad-clover; for it is certain, every thing considered, there is near twenty shillings disadvantage, communibus annis, by sowing vetches in land that will bear clover.

REAPING and MOWING.

Of the
time of
cutting
corn.

To be cut
before it is
full-ripe.

§. i. ^a **T**HE antients reaped their corn before it was full-ripe, as Pliny informs us.

It is certain there are very great disadvantages in letting some sorts of corn stand till it is full-ripe before it be cut. — First, both the chaff and the fodder are worse, — and, if such ripe corn takes wet, the increase in malt is lost, if barley, it having already spent itself, — and if it be wheat, the flour is much the worse, and the wheat diminished, — but if corn be cut greenish, it will bear a pretty deal of wet without damage, for it will not drink up the wet like corn full-ripe; but rather only take in so much as to be kindly fed by it; — but if any sort of corn be blighted, the sooner it is cut down, tho' but half ripe, the better, for nourishment can no more be conveyed to it by the straw, whereas by lying in gripp it will be fed: — it is like feeding sick persons with clysters, when they can take no nourishment at their stomachs, or turning a child to weaning, when it will thrive no longer with the nurse's milk.

Especially
weedy
corn.

Corn that is full of weeds ought to be cut three or four days sooner than ordinary, that the weeds may have time to wither, and yet the corn not suffer by being over-ripe; whereas, if the corn in such case be full-ripe, it will be liable to take damage by brit-

^a Secandi tempus cum spica deflorescere coepit, atque roborari: secandum antequam inarescat. Plin. fol. 314.

ting as well as loss of colour, or by rain, if it be kept out till the weeds are withered.

§. 2. If corn, or grass is so long as to lie down, they observe to cut with the corn, not against the head of it that is falling; — but if it stand upright, they observe as much as possible always to cut cross the furrows, and the same in meadows, if there be any furrows, that they may cut the bottoms; for, if they cut along the furrows, the rising lands will carry the scythe over the bottoms, so that it will leave the grass uncut.

§. 3. If corn comes in wet, or not well dried, though it will not take much harm in the mow, yet as soon as threshed, and laid together on an heap, it will in a week's time sweat and cling together; and be as white with moldiness as if flour had been strewed on it; — such corn therefore ought, as soon as threshed, to be sent to market, and sold.

§. 4. It is said, for corn to lie in swarth a day is very good though a shower of rain should come; for it makes it feel dry and slippery, and thresh the better: — and Mr. Edwards blamed a neighbouring farmer much for hurrying in his corn so fast, if there was but any likelihood of a shower; whereas, said he, a day's rain never did it harm, but rather good, and wheat after cut was the better for a wet day. But, said farmer Biggs, there is nothing lost by carrying it in before such shower of rain may fall; for, tho' it will feel cold, yet, not having laid abroad to take the sun and rain, it will not be shrunk so much as if it had done so, and the fewer grains will go to fill the bushel, and that will make amends.

§. 5. Mr. Edwards cautions me not to make great barley-cocks, nor great oat-cocks, but middling ones: if the corn be thick, said he, the task-workers will be for making great cocks, which the men cannot pitch into the cart, when they take off

the tops, unless they trample on the cocks, which makes the corn brit, especially when dead-ripe.

In hot
summers to
employ the
more reap-
ers to
make ex-
pedition.

§. 6. In hot summers you are to consider, that wheat is plump, and full in berry, and the plumes or chaff starky, and not tough, as in cold wet summers, whereby it holds the corn the closer, and you ought to man your harvest accordingly by setting on in hot summers the more reapers; for such corn, when scorched up by the sun, and full in grain, will soon take a stain, and damage by wet, and brit, and be blown out by the wind: when you have it dead-ripe, and of a good colour, it is all you can desire: therefore in such case the less it lies abroad in gripp or shock the better; to which end the higher they cut the wheat, so as to cut the less grass, the better; that it may be the sooner in order for carting.

Why they
leave a
high stub-
ble in
Leicester-
shire and
North-
ampton-
shire.

§. 7. The chief reason, as it seems to me, why in Leicestershire, Northamptonshire, and such deep lands, the farmer cuts the wheat high from the ground and leaves a high stubble, is because in low vale countries, where the land is rich and deep, and inclosed countries, the wheat, after it is cut, and lies in gripp, does not lie so exposed for the sun and wind to dry the gripes after being fogged with wet, as it does in the hill-country; therefore the higher the stubble is left the gripes are thereby born up the higher, and lie the hollower from the ground, and consequently are the easier dried by the sun and wind.—It is also to be remembered, that the fatter and richer the land is the sooner the gripes will grow after they have taken wet, in case they lie on the naked ground, and sooner than they would in such case do in the hill-country, where the land is poor;—therefore it is very proper to leave the wheat-stubble the higher, that the gripes may thereby be born up from the ground; besides, the shorter the sheaves are made the more the barns will hold,

hold, and the use of the after-stubble, which makes excellent * elm, will compensate the loss of the straw. * thatch. In some places they mow it for drying malt.

§. 8. The forwarder any countries are in their harvest, whether by the forwardness of the year, or the natural heat and warmth of the soil, so much the bolder may the husbandman be in leaving his wheat the longer abroad in the field, to take it's airings, and grow mellow, which makes it thresh better and look finer: for example, when the wheat-harvest falls out in the middle of July, or at least before the latter end of it, as it did anno 1714, there can be little danger in letting the wheat lie abroad four or five days, or a week, in case it be cut not over-ripe, even tho' a rainy day or two should come; for at that time of the year the sun is so hot, the days so long, and the grass so short, and the dews for the most part so little, that the corn, tho' it has a good rain, soon grows dry; whereas in the middle, or the latter end of August, the rainy season generally comes in, the dewy nights grow long, the grass rough, and the sun's drying power much abated, so that, if rainy weather should come, the wheat will be much more apt to grow.

§. 9. Red-straw wheat ought not to stand till it is so ripe as white-straw may do, because the red-straw wheat is much apter to brit, if wind should come; therefore the common saying is, that red-straw wheat must be gathered knot-green, that is, whilst the knots in the straw are green.

Beyond Winchester they cut red-straw wheat greenish to amazement, a fortnight earlier than we should do, and let it lie in gripp a fortnight, often turning it; and for reaping, turning, and binding into sheaves, they pay six shillings per acre, whereas at Crux-Easton we pay four shillings, — but they think theirs the best husbanday.

X 4

§ 10. It

The forwarder and warmer any country is, the longer the corn may lay in gripp.

Red-straw wheat to be cut greener than white-straw.

Blighted
wheat
should be
the sooner
cut,

§. 10. It is agreed, that wheat should be cut sooner for being blighted; because the straw of blighted wheat, by standing till the corn is full-ripe, will become so brittle there would be no handling it. And it is farther agreed, that blighted wheat should be longer in gripp than other wheat that it may plim, which it requires more time to do: it will make it thresh better, and come the clearer from the hull.

Blighted
corn
known by
the mow-
ers.

§. 11. In mowing, a blighted patch of corn is known as soon as the mowers put the scythes into it; for it is soft and tough, and they had as good cut against wool; besides it is more-loose, that is, loose at root.

Wheat for
seed should
be cut
riper.

§. 12. Wheat designed for seed ought to be cut riper, or at least to lie a longer time abroad in gripp or sheaf than otherwise it need to do, or else, being for present threshing, it will not come clean out of the straw, and the softest grains will beat flat; but, if it be designed for a reek-staffold, and for keeping, it will, by lying and sweating in the mow, tho' carried in somewhat greenish, and without lying in gripp or sheaf, come out of the straw, and thresh very well.

It is certain, that the gripes of wheat, tho' laid as light and hollow as possible, will by the weight of the ears fall to the ground, and take harm, if suffered to lie long out in wet weather; though the ear of the gripp be set hollow, yet it will fall lower than the root-end of the straw.

Straw
worse for
lying out.

§. 13. Though most corn is the better for lying in swarth or gripes to take the dews, yet the straw is the worse for it for fodder, except it was cut before it was ripe, and only lie till sufficiently ripened to be carried in.

In hot dry
summers
wheat need
not lie long
in gripp,
and why.

§. 14. Take notice,—in hot dry summers, when corn ripens fully, and it's own virtue gives it a colour, and plumps up the berry; there is no need
to

to let wheat lie out in gripp before it is sheaved, nor in sheaf, as you would do in a cold summer, unless it be very grassy or weedy; but in cold summers the wheat is horny, and wants a colour; and the berry is thin and wants to be plumped; and the chaff of the chesses is clung, and wants to be mellowed in order to make it thresh the better: whereas in good and fruitful years the grain is full and swells the chaff, even till it opens, and so the wet will soak in the sooner, and stain the colour of the wheat; and in such good years it ought to be considered, that the ears are heavy, and, when they are in shock, they spread and hang over, being lop-heavy, whereby the sheaf opens wider, and lets the rain into the bonds sooner than in cold summers, when, the wheat being light, the ears in the shock stand more upright and closer together.

§. 15. It is most adviseable to turn gripps of wheat lying out very early after being cut down, in order to get them dry as soon as possible; by this means you keep them the longer from growing, in case of rain; for when gripps have lain some time fogged with wet, if dripping weather, or only driving mists should continue, all the art imaginable cannot prevent their growing.

§. 16. In a hill-country, especially where there is cold clay-land, singular regard ought to be had in harvest-time, not to gripp up the wheat into sheaves too early in the day; for in such a country the gripps take so great a damp by having laid on the ground, that, tho' the straw, and chaffy ears may seem to be dry, when the dew is first gone off, and after the sun may have shined an hour or two on the gripps, yet there will remain an inward dampness in the corn, and in the inside of the straw, which being so reeked up will come damp from the reek at threshing-time. — Therefore the afternoon

Caution —
to turn the
gripps.

Not to
gripp up
the wheat
too early in
the day, in
a hill coun-
try.

To carry
as soon as
reaped.

noon is certainly best for gripping and binding into sheaves, but so that they may be finished before the heat of the day is over; yet the bonds ought to be laid in the morning, that they may not crack.—My opinion farther is, that in such a country corn can never be better housed, if thorough ripe, and hard, and not weedy, than by gripping and carting as fast as it is cut down; for the dampness it takes by lying on the ground in the cold nights is not so easily recovered.

Of binding.

§. 17. The farmers do not always look well after the binding up of their sheaves, but suffer the reapers, for dispatch, to bind the bonds just underneath the ears, instead of binding them at the other end: the consequence of which is, that they will hardly hold together to be slung into the cart at harvest, and will certainly be in great danger of falling to pieces before threshing-time,

I was telling one of my harvest women, that she must rake oats for me on the morrow morning; she replied, it must be after the dew was off the ground, for till that time she should be making bonds for the sheaves she had gripped for the farmer; for after the dew was off they could not be made.—I asked her why; she said, the straw would not twist after the sun was up, but would be brittle, and break off below the ears.

It rained in the morning while my wheat lay in gripp, but seeming to hold up a little, I told one of my reapers, he might make bonds. He replied, unless it was like to be dry it was to no purpose to make bonds; for, when the bonds are made, they must lay a gripp or two on them to keep them in their places, otherwise the heat of the sun will make them untwist; and therefore, unless it was likely to be fair, it is improper to lay the gripps upon the bonds, for the bonds being pressed down will grow
sooner

sooner than any other corn, if rain should come, because they lying undermost cannot dry.

Sheaves ought not to be bound up wet; if they be, they will be moldy: tho' the bonds must be made in the morning-dew, yet the sheaves ought not to be bound up till perfectly dry.

The reapers were complaining, the weather was so hot, that their bonds laid in the morning would not hold at noon, when they came to bind; but, said they, old Cole's held; for he turned three or four stubble or bottom-ends of the straw to the ears of the bond, which made them hold, they being thereby tougher, greener, and stronger.

If in harvest-time you foresee a little rain, it is best to gripp, and bind up into sheaves, because a little rain will so wet the grippings, that they cannot be bound up, and it may hold so, on and off, till greater rains come, but the sheaves being bound will soon be dry; but if you foresee a hard rain, it is better not to bind up into sheaves, for the sheaves will then be wet to the bonds, and must all be opened again.

§. 18. If rain comes in harvest-time, with a driving wind, it is the most dangerous of any weather for sheaves of wheat, and for sheaves that are wet to the bonds it is worse, as all farmers do agree, than downright soaking rain.

Driving wind with rain the worst of weather for the wheat-sheaves. Of making small sheaves in a wet harvest.

§. 19. In a wet harvest there is this benefit in making small sheaves, that being thinner at the top, and falling closer, the rain does not fall down into the middle of them, and so go through them into the bonds, as it is apt to do in great sheaves, which lie broader, and take a larger compass.

Care ought to be taken that the sheaves are made small, in case you are obliged to gripp and bind up wheat that is weedy, or thistly, into sheaves, as for particular reasons you may be, viz. for fear of rain,

For weedy corn.

or

or on a Saturday-night, because you fear the weather on Sunday, that so the air, wind, and sun may have the greater power to dry them, which they could not do, if they were made large.

To lay the sheaves flat the first night.

§. 20. Mr. Whistler and Mr. Edwards, men of very good judgment in farming matters, were of opinion that it was best the night after the wheat was bound, if the weather was not catching, to lay the sheaves, one by one, flat on the ground, whereby the straw would close together, and stand with the ears stiff and upright, and not be apt to lay open, and then five or six sheaves being put into the shock would abundantly better keep out the rain.

Not to lay the ears in the furrows.

§. 21. Some of the reapers had laid the ears of the grippings in the furrows of the lands, and the halm-end out, whereas they ought to have laid the straw-end in the furrows, and the ears out, and then the ears would have stood sloping-up, and have lain dry, though rain had come, but the other way it would quickly have grown,—and so I found it to do.

Of cocking wheat in Wilts.

§. 22. In Hampshire they never cock the wheat in the field, as they do in Wiltshire, whereby they may leave it out a month longer without damage; and, if they did so, the wheat would thresh much the better, for the air dries it; whereas when carried forthwith into the barn, it is tough, and sticks to the chaff.

In making the wheat-pooks in Wiltshire, the sheaves are set with the ears uppermost in the circle, and so on in every rundle, till at length it draws into a point; and then the sheaf is opened and turned with the ears downward, like a shackle for a hive; for an ear turned downwards will not grow, nor take wet by half a year's wet weather, and the bottom of the sheaf being broader than the top, every uppermost circle hangs over the sheaves of the undermost circle, likethe eaves of an house.— In a pook may be

be put a load or two; it is a very good way to secure corn against rain, and to give the weeds that may be amongst it a drying-time.—In my opinion however this method is not to be used where the wheat is designed for a staffold, because, if the weather prove wet, mice will run thither for shelter, and be carried in with the pooks.—Farmer Miles says, in that fashion, without thatching, they make wheat-reeks in the Isle of Wight.

§. 23. In wet harvests, I advise, when the weather clears up, to send some of the most diligent and skilful persons into the field to search the tythings of sheaves, and to observe well which lie most on the weather-side, and stand most hollow, and open at top, and to remove all such together by themselves, and place them to such advantage, that the sun and wind may best go through them, moving them off from the sides of hedges, &c. and taking up such sheaves as may be blown down.

Caution regarding the management of the shocks in wet weather.

After rainy weather, tho' the wet should not have gone to the bonds of the sheaves, yet it is good, when dry weather comes, to set the sheaves of every tything apart, so that the air may come to every sheaf, and particularly to take care to turn the weather-side of each sheaf to the wind to dry the sooner; for tho' the wet may not have gone to the bonds, yet the sheaves are inwardly cold and damp, but will by this method be much sooner fit to be carted.

§. 24. My next neighbour, anno 1696, unsheafed some of his wheat to dry it, and opened it, and turned it so often, that the ears broke off, whereby he lost half his corn; caution therefore ought to be used in this case, lest by curing one evil we create a worse.

Damage from opening the sheaves to dry them.

§. 25. A smart shower of rain fell on my wheat-sheaves, and it was thought it went down to the bonds; whereupon, the next day being fair, the men

Wheat, if wet at bond only will be damaged in the reek.

men took apart each tything, and set the shocks upright at some distance asunder, spreading open the ears of the shock to let in the sun and air; — but afterwards my bailiff found that the rain had gone through the bonds, so that he was for unbinding them, and opening them to the sun; — for he argued, that if the inside of the sheaves were but wettish only, and from the ear to the bond were dry, such sheaves would grow moldy in the reek, and strike such a damp, that would cause many ears to grow, and therefore he advised to open them. — I did open them, and found them to be dampish, and some of them wet beyond the bonds. This was done to fix load of wheat, and the sheaves were bound up again without much loss of time.

Wheat long-eared and lop-heavy should be carted soon for fear of wet.

§. 26. One of my reapers, when he had made up some wheat into sheaves, the wheat being long-eared and lop-heavy, said, rain had not need meet with those sheaves before they were carried home. — I asked him why so; he said, because the ears being long and heavy were bussle-headed, — that is, did hang their heads downward into the sheaf, so that (in case a rain should run down to the bonds) neither sun nor wind could enter in to dry them, whereas, said he, when the ears are short, and not heavy, they stand upright and hollow, so that the sun and the air may easily dry them.

Caution in mowing corn.

§. 27. I ordered my mowers to set their cradles down as close to their scythes as they could, for the benefit of the swarths, the barley being very short: if they had not done so, they had lost half the corn; but their cradles carried the short barley together in a swarth abundantly the better, by which means it might be raked with less loss. — N. B. To see that other mowers do the same in such case.

Cut grass in stony ground with an old scythe.

§. 28. If one cuts grass, where stones are, with a new scythe, and it should strike against a stone, the scythe will break out into flakes, but an old scythe that

that has been seasoned will only be blunted, and may easily be ground out again.

§. 29. If corn harles or lodges, a scythe cannot carry a cradle, because the fingers of it will be pulled to pieces by the harled corn in drawing the scythe back; but in that case, a bow on the scythe is most proper, which will carry the swarth away before it altogether.

A scythe for cutting lodged corn.

§. 30. The thinner and poorer barley and oats are, and the weaker in straw, they ought to be cut a little the sooner, and lie in swarth; for otherwise the straw, if they are full-ripe, will not stand against the scythe.

Thin and weak barley and oats should be cut the sooner.

§. 31. I sowed broad-clover with barley, and, by all the country-men's judgment, it was deemed proper to mow this barley a week sooner than otherwise it need to have been, because the clover grew up rank, and it was agreed, that, if the barley stood till it was full-ripe, or but near it, as the clover would require four or five hot days to dry it before it could be housed with the barley, it would in that time, in case two or three days rain should fall, be turned black, whereas, being cut thus early, it would take no damage by such weather, but require to stay abroad as long as the clover.

If clover be rank in barley, the barley should be sooner cut.

§. 32. I had barley this year (1702) knee-bent in a very extraordinary manner, and, being dead-ripe, it was crumpled down, and harled by contrary winds; I added my own men to the mowers for dispatch: but my men having only grass-scythes, which are not so long as the others, could not dispatch like them; — but farmer Biggs and farmer Knapp said, that in this case the shorter scythes were more profitable to mow with than the others, and missed less of the corn.

Knee-bent barley to be mowed with a short scythe.

§. 33. Barley has been so rank in some places in a wet spring that it has been thought fit to mow it, and

Better mow than feed rank and barley.

and in such case it may be better to mow it than to feed it, because the scythe only takes off the rankest, but the sheep feed upon all indifferently.

Of letting
barley lie
out in
swarth.

§. 34. This year (1702) the weather being encouraging, I left out barley five or six days in swarth, which, though both blighted and edge-grown, plimmed, and gained very near as good a colour as the best.

Benefit of
turning the
barley
swarths in
wet weather.

§. 35. The 30th of August (anno 1708) I cut barley from day to day, and continued to do so for a week; from the 30th of August, for three weeks together, we had every day rain, more or less, but most of the time rain fell plentifully every day. — I ordered my barley in swarth to be turned every other day during these three weeks, to keep it from growing; and though the swarths during this time, that lay uppermost to the air, were hardly dry for any six hours together, — and the undermost barley of the swarths, which lay next the earth, was generally fogged every day, and dungish till turned, as abovesaid, yet I had none of my barley grew. — This was chiefly owing to the late season of the year before our barley ripened, and the continued cold rains, which did not much forward the growing of the barley, as they would have done, had the harvest been forwarder; for, had the rain been accompanied with hot sun and glooms between, it would in half the time have made it grow. — I mention this, that in such case, when such a year may happen again, I need not to be frightened, as we all were this year: in our hill-country the winds also contributed much to save us.

Oats on a
side-land
to be mowed
earlier
than on a
flat.

§. 36. The first year that I took one hundred and forty acres into my own hands, I had the side-lands sowed to oats. — It was agreed by every body, that those oats ought to be mowed two or three days sooner than if they were on a plain, because, say they,

if

if you let them be as ripe there as in a plain one should do, the straws will be so hard and dry that the scythe will skim over them.— The reason of this is, because in such ground a man has not so good a stand, nor can put that strength to the scythe, his swing being weaker, as he might do in a plain, and so the straw yields and bends.— Two acres of oats mowed per day in such land is accounted as good a day's work as three acres in plain land.

§. 37. My labourers came from mowing vetches to mow peas, not having their hackers with them, and they were loth to go home for them for a piece of a day: I soon came to them, and found that the scythe made great waste, and cut off abundance of the kids in the middle,—and they themselves could not but be ashamed of their work. I mention this, because I am told it is the custom in some parts of England to mow peas. Peas hurt by mowing.

§. 38. I am told, that between Caln and Chippenham the land is almost as light as ashes, and of about six shillings per acre, and that there they neither mow nor hack their peas, but pluck them up.— Quære, whether this was not, for the most part, the condition of the east-country-land, and whether their wool will not pull off better than with us. Peas plucked up in light land.

§. 39 The blue pea, or green pea, which is for boiling, is to be cut green, when the peas are thoroughly full-kidded, before the upper side of the kids toward the sun be turned, as they will turn white; for then that whitish half will not boil well, nor the peas sell in the market for boiling.— An old experienced farmer told me this, whereupon I went and gathered some of my own peas, which I thought not ripe enough to cut by ten days, according as the partridge-peas are cut, and when I shewed the kids, he said, by all means, it was fit they should be cut. I wondered at it, and asked if they The blue or green pea for boiling, should be cut early.

would not turn black; he said, no, they would keep their green colour, though wet weather should come upon the halm, and turn it as black as a hat.—But they ought not to be threshed any time before they are boiled, or sowed; for in four or five weeks they will finnow.

Partridge-peas, if cut green, turn black.

§. 40. Mr. Jackson of Tackham assured me, that he sowed partridge-peas, which by having been cut green were turned as black as a hat, and yet he had as good a crop as he ever had: this crop I saw, and they were very good peas.

If vetches do not kid well they should be sooner cut.

§. 41. The different opinions of my two ox-hinds divided me much about the season of cutting my winter-vetches.—The one was for having me cut them when near full-kidded, and seemed most to regard the kids.—The other regarded the halm more than the kids, and said, the horses were as fond of the halm, if taken in season, as of the kids, therefore the halm ought not to be suffered, if one can help it, to rot on the ground—Farmers Elton and Oliver agreed, that if the vetches fell out of the kids into the manger, the horses would not eat them, and said, if vetches in the grain were set before horses, they would not care for them, so said Mr. Edwards's servant;—but Elton added, there was moderation on both sides to be regarded, and extremes to be avoided, but, if the vetches did not kid well, he thought the best way was, especially if the season was like to be dry, to cut them the sooner, for so they would make the best fodder.

Vetches should lay out before given to horses.

§. 42. My winter-vetches were very well kidded, and almost fit to be cut, and housed for winter-fodder.—Several farmers were of opinion, they were then in very good order for horses; but if, whilst I gave them green to my horses, they were cut and laid on the ground two or three days to wither a little, they assured me they

they would be more hearty; for it would take somewhat from their grossness.

§. 43. When you cut winter-vetches for winter-fodder, in the timing it you ought to consider, that when they are cut green, they require a long time to dry in, during which, especially if the weather be wet, the vetches will continue growing, and the kids, tho' lean when you cut them, and but two rinds, yet will fill out, and almost perfect their feed in the fortnight's time that they must, for the most part, lie abroad; therefore of whatever size you would have the berry of, you must cut the vetches at least a week before they come to that growth. — You ought always to cut them so early that there may be no danger of their kids splitting, and shedding in the foddering with them, which they will do, in case you suffer them to be near ripe; besides, the riper you suffer the feed to be, the coarser will the straw or halm be at the bottom, especially if the vetches through a wet summer are grown gross.

Time of
cutting
vetches.

§. 44. If vetches are short, as being blighted, or otherwise, and dead-ripe, it will be difficult to hack them, but impossible to mow them, because their halm, which will be hard and dry, having no weight to bear against the scythe, will yield, and the scythe will slip over them.

Vetches
short and
dead-ripe
cannot be
mowed.

§. 45. When I was mowing my meadows at Easton (anno 1701,) about nine in the morning, one of my mowers began to complain, that about this hour, when the dew went off the grass, was the worst time of all the day for mowing grass: and so it is, said he, for corn too. — How, said I, worse than at noon, and after? he said, yes. — Then I went to the other mowers, who were mowing in another part of the meads, and asked them at what time of the day the grass mowed best; they all said at noon. Why, said I, your fellow says —, &c. (as

Grass
mows best
at noon.

above) and therefore before the dew is gone off, I thought had been the best time.—They said, no; a hard scythe will cut the grass best at noon, but a soft scythe while the dew is on the grass.—Why then, said I, do they say (if noon, which is in the heat of the day, be best) that the grass cuts best after rain? for in this dry time we have at present, I hear you complain of the ill mowing of the grass.—They said, that is, because the drought has lain so long upon the ground as to make it hard, so that when the scythe cuts close, it dances upon every little roughness, whereas, was the ground a little moistened with rain, the scythe would cut it, and every little excrescence would be pared off; and then the scythe would not scratch so often, nor so often be blunted.—I went to the first, and asked him of the truth of what they said, and he said it was so.—So that it seems they were both in the right; and though grass mows best at noon, yet it mows worst, when the dew is just going off: the reason they could not give me, but I suppose, that on the first going off of the dew the grass is not stiff enough to stand so strong against the scythe, nor so heavy, nor weighty as when it was loaded with dew, which made it lie close; yet at noon, when the grass was become dry and stiff, it stood closer than when the dew was on it.

Better to
mow by
the day
than the
acre in the
hill-coun-
try

If grass be
not fed
clean
against
spring, the
old rowet
damages
the grass
and blunts
the scythe.

§. 46. In our hill-country, where grass is short, I hold it best to give one shilling and six-pence per day for mowing; I rather choose to do so than to agree by the acre, that the work may be more carefully done.

§. 47. As one of my labourers, an old experienced hind, was mowing, he complained of the old rowet, that hindered him, and deadened his scythe.—It was some time before I knew what he meant; at length he pulled up some spiry tough capillary grass, about

about three inches long, which was the old winter-grass: It seems I had not fed the grass down so low as I should have done against spring, which did harm to the young grass that was to be cut; for, if that had been fed better, the young grass would have come away thicker, and not have choaked up the scythe. He compared it to the young wool, which (when sheep have been pretty well kept in winter, and then checked in the spring) comes up under the first wool, and deadens the shears, so as to make it troublesome to cut with them.

§. 48. I was mowing broad-clover, where some of it in gully-places was short, and I proposed to miss those pieces, and not mow them, but the mowers were against it, and said, the shortest, when mowed, would come away much better for mowing, and fill towards the next crop.—Mr. Edwards being present said, that farmer Elton had once some poor patches in his mead, which, being short, he would not be at the charge of mowing, but those patches were thinner for it afterwards in future crops.

Grass, tho' thin, should be cut.

R A K I N G.

§. 1. **T**HOUGH mowing and raking of corn are the same price per acre, yet you must have double the number of rakers that you have of mowers, in order to make equal dispatch, because the mowers have not the lets and hindrances that the rakers have: the mowers can continue mowing in moderate rain, as well as begin early in the morning, whereas the rakers are stopped with every shower, and commonly lose two or three hours in the morning in staying till the dew is off the ground.

Two rakers to one mower.

§. 2. If the land be stony, and the straw of the barley short, it will do well to rake up the barley and cock it soon, lest rain should come; for rain will

Rake the barley and cock it soon in stony land.

CARRYING of CORN.

so beat the barley into the ground, that there will be no raking up half of it.

To employ men rather than women at raking barley.

§. 3. Anno 1701, my broad-clover came up with my barley so high, that they were forced to cut the barley under the ear: I thought the barley would rake much the better for the broad-clover, inasmuch as it would be kept up from sinking into the ground.

— But the mowers said, no; that the broad-clover was so long and thick, and the stubble left so high, that it would be hard work to run the fork along under the swarths, as also to draw the teeth of the rake through the mattings of the grass.— I believe therefore it would be more for the farmer's interest to employ men at this task than women.

One to rake oats after the cart—
two to rake barley.

§. 4. One person is counted sufficient to rake oats after the cart; unless in a very high wind, but to rake after the barley-cart, be the wind never so still, two persons are always reckoned necessary.

CARRYING of CORN.

When barley is short two, pitchers to one loader

§. 1. **W**HEN the barley-straw runs very short, it is good husbandry to have two pitchers to one loader in the field; otherwise time will be lost.

Wet corn to be put round the sides of the barn.

§. 2. If a load or two of corn comes in wet, in case your barns are boarded, it will do well to scatter it round about the sides of the barn.

Blighted wheat to be carried as soon as can be.

§. 3. If wheat be struck with the blight, the straw in such case is hollow and spongy, and easily drinks in wet; therefore, if the corn be tolerably dry, and in order, and the weather be anywise suspicious, it is adviseable to get it into the barn as fast as possible; for if such loose straw should once soak in wet, and showery weather should follow, it will be much longer before it can be got dry, and fit to be carted, than other corn.

§. 4. A

T H R E S H I N G.

343

§. 4. A rimy day is better to carry home oats in than a hot day; for in hot dry weather the oat-straw will be so sleek, that it will be troublesome loading and tying it together, so as not to slide off from the cart, or not to swag to the side the cart may lean on, and so over-turn it.—Again, oats will be tougher, and less apt to brit in carrying on a rimy day than on a hot burning day.

To carry oats in rimy weather.

§. 5. Mr. Hillman, and another experienced farmer, said, it was most profitable at harvest to carry light loads near home, and bigger loads farther off, not only because, in case it be near home, the larger loads take up more time in binding them, but also because one man can pitch down at the barn faster than two men in the field can pitch up, especially after the load rises to a height.

Carry light loads near home, and larger farther off.

T H R E S H I N G.

§. 1. **I**T appears from Hammond, on Matt. iii. 12. —the Jews threshing-floors were on the mountains, and open fields, where the wind could have free access, and so it is, he says, in some parts of Spain.—By Varro it appears the threshing-floors were generally uncovered, yet some were otherwise, but the uncovered threshing-floors were laid round that the water might run off. Lib. 1. c. 55.

Threshing-floors of the antients, and in hot countries.

^a In some places they threshed out their corn with flails on a floor, in others they trod it out with mares, and in others beat it out with poles.

§. 2. It seems the antients had some use for chaff, viz. in making of floors, though *palea* signifies indeed straw as well as chaff. Cato, fo. 18.

Used chaff or straw in their floors.

^a *Messis ipsa alibi tribulis in area, alibi equarum gressibus exteritur, alibi perticis flagellatur.* Plin. lib. 18. c. 30.

§. 3.^b In countries subject to rain they had their barns contiguous to their threshing floors, and their floors also were covered, of which see Varro, fo. 34.

— Some, he says, fortified the sides of their floors with stone, others made an entire stone pavement; he agrees with Cato, that rubbing the floors with the lees of oil was necessary to prevent the growth of weeds in them, and a protection against vermin, particularly ants and moles, to which oil is poison.

Earthen
floors in
Leicester-
shire.

§. 4. Mr. Tate was finding fault with the stone and earthen floors of Leicestershire, and said the farmers were wedded to them,^c notwithstanding one Sturt (as I think he named him) who lived at Wickham, and had been the greatest commissioner in England for buying up corn, had assured him, that those floors communicated such dampness to the wheat, that it was the worse, either for keeping or exporting, by six-pence in the bushel.

Thresh-
ing in hot
countries.

§. 5. In Italy, and other hot countries, they usually thresh and winnow their corn as soon as they have cut it down, or at least a great part of it, and this is done, before they bring it into the house, on a floor made in the open air. — Being kept poor they have but very small farms; — and I am apt to believe that in Judea they did thus, because their possessions were cantoned into so small divisions. See Ray, fo. 402.

^b Amurca perfundere solent areas, ea enim herbarum est inimica, et formicarum, et talparum venenum; quidam aream ut habéant solidam, muniunt lapide, aut etiam faciunt pavimentum: nonnulli etiam tegunt areas ut in Bagiennis, quod ibi sæpe id temporis anni oriuntur nimbi. Varro, fo. 46.

Areas amurcâ conspergito, sic herbæ non nascentur. Cato, fo.

14.

Quatenus ad aream; huic autem nubilarium applicari debet, maximeque in Italia, propter inconstantiam cœli, quo collata semitrita frumenta protegantur, si subitaneus imber incefferit: nam in transmarinis quibusdam regionibus, ubi æstas pluvîa caret, supervacuum est. Columella, lib. 1. fo. 93.

§. 6. Iron-

§. 6. Iron-clayted shoes do not well to thresh wheat in, especially if it be new corn ; for such shoes squate and bruise it much : a thresher's shoes should by right be soled with an old hat. Of the
thresher's
shoes.

§. 7. One of my servants being threshing peas, I asked him whether the floor was not too small for two men to thresh in together ; he said, no, not to thresh peas in, but it was too small for two men to thresh barley, or other corn in, because the flail makes the straw of light corn fly away, and the threshers must keep moving to follow it, and so would be streightened for room ; but a wad of peas, when laid down on the floor, not only lies heavy, but harles together also, and lies for the most part in the same place it was at first laid down in, and so the threshers need not keep moving, but stand in one station, by which means they will not stand in each other's way. Two
threshers
require a
larger floor
for barley
than for
peas.

§. 8. A good thresher assured me, that twelve bushels of oats were counted a good day's threshing, but he had lately for several days together threshed fourteen bushels, and winnowed them ; but those oats yielded extraordinary well. He said likewise, that twelve bushels of barley was a good day's threshing, and in the country the common price was eight-pence per quarter ; but five or six bushels of wheat was a very good day's threshing, and, in case the corn was clung, and yielded ill, sometimes three bushels was as much as could be threshed in a day. Of the
quantity of
corn to be
threshed in
a day.

I have for some time been uneasy about the small quantity of wheat my threshers used to thresh in a day : my best thresher seldom in any year exceeded a sack in a day : I had this day (November 5th anno 1714) a serious argument with him about it, another good thresher being present.—The first persisted, that it was well known to the threshers of the country that they could as easily thresh six bushels of It de-
pends on
the soil
the corn
grows on.

of wheat in a day at Netherton-farm, it being a warm gravelly bottom, as they could thresh four bushels in a day at Ashmonsworth, or Crux-Easton, for on such cold lands the corn threshed tough. — The other said, he had threshed at Netherton-farm for two or three years, and that they commonly reckoned the same difference in threshing, as above-said, between the wheat of that farm and the wheat of the cold hill-land of Faccomb, where the village stands. — So that the difference between the cold hill-lands, and the warm vale-lands, with regard to threshing, I now look on as a settled point. — And note, — in such a cold hill-country as our's at Crux-Easton is, men thresh harder to perform their day's-work than in the vale, where the corn threshes easier, because the stroke of the flail must in such cold countries be forced down stronger, to beat out the corn, than in the vales, where a lighter stroke does more work.

It is to be considered, that Faccomb, and my neighbours wheat yields more in a day's threshing than in the clay-lands, because their lands being lighter, the straw runs shorter, and consequently more sheaves are laid on the floor, and the more ears of corn must therefore be laid there; whereas on my clay-land the straw runs longer, and consequently the fewer sheaves and ears of corn are laid on the floor to fill it.

§. 9. One week in particular our wheat yielded very little flour in grinding, and had abundance of bran, of which the miller also complained. — My threshers assured me, the reason was, because I had threshed that wheat whilst the weather was damp; for, said he, then the wheat will be cold, and will not grind well, notwithstanding the weather be ever so dry afterwards: but if threshed dry, and put into sacks, it will not afterwards grow heavy, and yet

Wheat to
be threshed
in dry wea-
ther.

yet if threshed in open weather, and then put into sacks, it will be musty in less than three weeks time.

§. 10. The beards of the barley will come off ^{Of thresh-} much better in threshing for the swarth taking the ^{ing barley.} dew.

§. 11. I had a mind to thresh out some vetches ^{Of thresh-} in the field; they were ripe, but a little soft, on ^{ing vetches} which, intending immediately to sow them, I asked ^{when soft} the farmer, (shewing him them) if they were not too ^{with damp.} soft to thresh; he said, all the danger was that, if threshed on a floor, the flail and the man's feet would bruise and break them, but to thresh them on a hurdle, with a cloth, would do well.

§. 12. I was asking a good farmer in my neigh- ^{Rye or} bourhood, whether it was best to carry rye-grass, or ^{clover-hay} clover-hay for seed, to the barn, or the reek, and ^{best thresh-} thresh it out afterwards, or to thresh it out in the ^{ed in the} field. field at hay-making; the farmer said, they did it both ways, but, said he, I think the best way is to thresh it out in the field; for, if the sun be hot, it will brit very much, and there will be great loss in carrying it home, especially if you go through narrow lanes, and then it will slack and give in the mow so that it will thresh but ordinarily, whereas, if threshed in the field about noon, when the hay is dry, one man will thresh as much as three men can do the other way.

§. 13. ^c As my bailiff was winnowing peas for ^{Caution—} feed, I observed a vast quantity of charlock among ^{to screen all} them; he said, it could not be helped; for charlock ^{seed corn.}

^c Mr. Duhamel tells us, it is a custom in that part of France he writes of—to half thresh the sheaves without untying them, when there is a great deal of weed among the wheat. By this means, says he, they get the ripest and best grain, and few seeds of weeds; for the weeds being shorter than the wheat, are generally at the bottom of the sheaves. Pag. 188.

was

was a seed that the fan would not separate from any sort of corn, but it might be done with the screen. — So I ordered them to be screened before they were sowed, and I advise the same to be done with all sorts of corn designed for seed.

Most chaff
produced
by wet
harvests.

* beards.

Of a straw-
house.

§. 14. Farmer Biggs, and farmer Bristow were saying, that all sorts of corn yielded but few hulls this year (1702.) (Note, it was a very dry summer and harvest). I asked them, what might be the reason of it; they said, that wet harvests made the hulls come off the wheat-ears much more than dry ones, and likewise the * oyls from the barley, but especially the small feathery hulls that are at the bottom of the barley-ears; and in such years the straw threshes very brittle, and breaks into little pieces, which adds much to the heap of hulls: it is also possible the oyls may grow longer in wet summers.

§. 15. Allow, if you can, an empty space of barn-room in harvest-time, to receive the litter, and foddering-straw, that you thresh out before cattle may come to fodder; otherwise such straw will be spoiled by throwing it into your back-side.

R E E K S.

Housing
summer-
corn pre-
ferred to
reeking.

§. 1. **I** A M upon experience an enemy to reeking corn abroad that you have barn-room for, except it be wheat: if you propose to thresh out your corn within the compass of a year, the damage it may take by mice in so short a space is inconsiderable, especially if by harvest-time you have got the dominion over the mice by store of cats, which a gentleman delighting in husbandry ought to value as much as many do their hounds: the damage sustained by mice will, I say, be inconsiderable in comparison of the charge of reeking corn abroad. The computation of which last will run thus, viz.
supposing

supposing it to be an oat, or a barley-reek of thirty two load, such a reek cannot well be supposed to be finished in less than two days; in loading and pitching to reek must be employed,——

		l.	s.	d.
Seven men at harvest-wages	——	1	8	0
Two teams of horses, two days		0	14	0
Thatching	——	0	3	0
Two load of straw	—— —	0	15	0
Elming	—— —	0	2	0
Stowing it in the barn afterwards seven men, a day	——	0	7	0
A team of horses, a day	——	0	3	6
		3	12	6

Besides damages by birds devouring the sides, and in hard weather pulling off the thatch, accidents by wet, charges and waste in taking in, and hindrance from taking it in, it may be a month, by hazy weather, or by not being able to spare people to do it, whereby many inconveniencies may be sustained, and the mice to be maintained are near the same.

§. 2. It is a common folly of the bailiff or other servants in husbandry to act without apprehensions of rain, when there is no appearance of it: if reeks are making in hay-time, or harvest, tho' the master has provided straw in abundance to secure them, yet, because the day's-business begins early in a morning, the servant is loth to bestow the time in carrying so much straw to the reeks as would secure them in case of bad weather, and, because the business of carting holds out late in an evening, the servants

Negli-
gence of
servants
in not se-
curing
ricks a-
gainst wet
weather.

Barley-
straw not
equal to
wheat for
thatching
reeks.

Of making
a wheat-
reek.

vants are loth to leave a half-made reek secure against all weather by pitching up straw enough upon it. — It is the master's business therefore to consider the temper of servants, and, if such works may be termed works of supererogation, to gratify with good ale rather than let them be undone.

§. 3. I laid abundance of barley-straw on the ridge of a long vetch-reek, and brought it up sharp; I believe when the reek was cut the straw was three foot thick, and yet the wet had run through this covering, and done considerable damage to the vetches: — the reasons of it were two; first, barley-straw is more woolly and spongy than wheat-straw, which is close and hard; secondly, the reek sweated and heated pretty much, and it is observed in such case the covering of straw is hollowed, and softened, and the reek thereby the apter to drink in the wet.

§. 4. I made my wheat-reeks on staffolds, and, when I came to thatch them, I made a question whether the perpendicular-side to the weather should not be thatched as well as the eaves; — my thatcher said, it was needless; — I replied, that farmer Crapp had told me, though he had housed wheat in a reek-house, yet for want of having the sides boarded, the wind had blown the rain against the sides of the reek, so that it had received great damage. — The thatcher replied, he knew of that very well; — for they had not minded to lay the ear-ends of the sheaves uppermost and upon a rise, all along as they made the reek, and to lay the straw-ends of the sheaves downwards; which if they had done, it had been impossible for the rain to have drove upwards to the ears; but on the contrary, in making the reek they laid the straw-ends of the sheaves higher than the ear-ends: consequently the rain that was blowed into the straw-ends must necessarily run downwards to the ears.

Harry

Harry Miles of Wiltshire was saying, that people in our country have not the way of making a reek well; for as they work it up, they should still keep the middle full, and then, when the reek sinks, that will throw the sinking of the reek to the outside, and so make the outside lie the closer;—whereas, if the middle be left hollow, the reek will fall-in in the middle, and the outside will be hollow.

It is proper in topping a wheat-reek to use a load or more of small sheaves, according to the size of the reek, because a reek cannot be so conveniently drawn-in and narrowed at top with great long sheaves as with slender short ones; therefore your husbandman ought to take care to order such to be provided, and out of the same ground from whence he makes his reek, in case he means to lay only the corn of a particular ground in the same reek.

Though a wheat-reek be well made, yet the bonds of the outer sheaves will be apt to grow, if long unthatched.

§. 5. We were setting up an oat-reek designed ^{Of making} to contain twenty load, but by the foundation of ^{an oat and} faggots I rather judged it fit to hold forty load;—^{barley-} ^{reek.} but the work-men said, the case was different between oats and barley; for barley-straw, being rougher in it's oyls, would not slip and slide as oat-straw would, it being sleek and slippery; therefore barley might be over-laid the foundation on all sides as much as you pleased, but an oat-reek, which way soever it inclined, would be apt to slip away and tumble down; therefore an oat-reek must not be widened beyond the foundation; especially if the corn is carried in dry, as this was, and so the more likely to slip.

§. 6. Farmer Wey of the Isle of Wight, ^{Of mice in} observing sparrow-holes under the eaves of a reek, ^{a reek.} said, if the birds roosted in those holes o' nights, it was

was a certain sign there were neither mice nor rats in the reek, for if there were, they would by their squeaking and running about at night so disquiet the birds, that they would not endure it: he had, he said, heard many ancient husbandmen make that observation.

Peas and wheat keep damp in reeks in the Hill-country.

§. 7. I took-in a load of great partridge-peas out of a reek that was well thatched, and had stood a year and an half: to my great surprize the peas were as soft as when the reek was made, but they were sweet and sound; I kept the reek for my horses.—The reason of their softness doubtless was the damp winter-air, and Crux-Easton mists, which the strong winds had forced into the very middle of the reek: —I made the same observation a little before of a wheat-reek I kept over the year, and threshed the latter end of the second winter.

Of a hay-reek.

§. 8. A great matter depends on the well reeking of hay, for hay will often swag and pitch in the reek after making, and must then be filled out with thatch to make it shoot off the rain as well as the rest of the reek.

Of the form of a reek, and it's heating.

§. 9. If a reek of hay be not well brought in, it will be apt to heat, and in that case a long reek is best, because it may be made as long, and as narrow as you please, and therefore will not be so apt to heat;—but there is the most loss in such a reek, because more of it, in proportion to what it contains, lies exposed to the weather; — therefore, if it be well dried, and well brought in, a round reek is the most profitable; nevertheless, if it be water-meadow-hay, let it seem never so dry, I hold a long reek to be best, for such hay will, notwithstanding it's dryness, be apt to heat. — That indeed might be prevented by keeping the middle of the reek hollow from the bottom to the top; but, when that is done,
all

all the sides of that hollow will be very finnowy, and a pretty deal of waste will be made that way too.

§. 10. Farmer Biggs, as we were speaking of the diverse ways of securing a reek of ill-got hay from heating, said, after I had told him of other ways, that they had of late years (before anno 1700) found by experience, that to cut a side-hole through the middle of the reek, of about four foot, or four foot and an half diameter, and to secure it by underpropping it with wood, was the best way, and the same method was used to prevent corn from mow-burning, either in a barn or in a reek.

I observed at farmer Pain's at Gausuks in the Isle of Wight, in a hay-reek cut into the middle some faggot-ends appear; I asked him the meaning of it; he said, it was an excellent way to preserve and secure a hay-reek from heating, which was done in this manner; — within about a yard of the bottom of the reek they fixed the first faggot end-wise, and then filled up the hay round it, and then placed another, and so on till within two or three foot of the top, and then they covered it, so that no wet could fall down to hurt the reek, and let it sweat for three weeks, during which time it would smoke like a chimney, and after that you might take out the uppermost faggot, and fill up the vacancy with hay, and then top-up the reek and thatch it for the winter.

§. 11. Last summer (anno 1701) I made a hay-reek, and a hard rain came upon it before it was thatched; but the mishap was, I thatched too soon after the rain was over, that is, before the outer-coat was well dry: in opening it for winter-spending I found, that as deep as the wet and the damp of it had struck-in so far the hay was finnowy, and dead, whereby I might lose a load of hay; but in case I

Not to thatch a hay-reek after rain till it is quite dry.

had not thatched it till the outside had beenfully dry, the hay had recovered it's old sweetness, and suffered no damage.

Of heating.

§. 12. Being informed that a vetch-reek I had set up had heated, I went to observe it, and, thrusting my hand into it, all along the side against which the wind set I felt no heat, nor in that end that took the wind oblique, but at the farther end from the wind, especially towards the farther corner of that end, it was considerably hot within six inches of the outside; so that it is the wind that drives the heat to and fro in a reek, and causes the pitching and yielding of it to that side it drives the heat to, and that vetch-reek, the wind being changeable, did for a week after it was made accordingly pitch from side to side.

G R A N A R I E S.

Of keeping wheat.

§. 1. ^a **S**OME, says Varro, have their granaries raised high above the ground, and some make them under ground, but in either sort they take care to keep out air and moisture, for if they get in, they will breed the weevil. Wheat so laid up has kept good for fifty years.

§. 2. Brown quotes authorities, that in Ægypt wheat laid up in the ears in granaries has lasted one hundred and twenty years, and says, more strange it may seem, how after seven years the grains conserved should be fruitful for a new production; for Joseph delivered seed to the Ægyptians to sow their

^a Aliqui ponunt triticum in granaria sublimia, &c. — Aliqui sub terris, &c. — Et curant ne humor, aut aer tangere possit, quo enim spiritus non pervenit, ibi non oritur curculio; sic conditum triticum manet vel annos quinquaginta, &c. Varro, fol. 47.

land

land for the eighth year; and Theophrastus says, seed of a year old is the best for sowing, that of two years old is not so good, but, when more than three years old it is quite barren, but proper however for bread-corn.—Yet seeing corn may be made to last so long, the fructifying power well may be conceived to last in some good proportion, according to the reason and place of it's conservation. Theophrastus says in another place,—In a certain part of Cappadocia called Petræ wheat has preserved it's fructifying power even to forty years, and has been good for sowing.^b

§. 3. In

^b Mr. Tull says, the most secure way he knows of preserving wheat is by drying it, and relates a story of a neighbour of his in Oxfordshire, who acquired a large fortune by this practice. His method was to dry it on a hair-cloth, in a malt-kiln, with no other fuel than clean wheat-straw; never suffering it to have any stronger heat than that of the sun. The longest time he let it remain in this heat was twelve hours, and the shortest time about four hours; the damper the wheat was, and the longer intended to be kept, the more drying it required; but how to distinguish the degree of dampness, and the number of hours proper for it's continuance on the kiln, he said, was an art impossible to be learnt by any other means than by practice. His speculation, that put him on this project, was, that it was only the superfluous moisture of the grain that caused it's corruption, and made it liable to be eaten by the weevil. When dried, the bakers allowed it to work better than new wheat, and every grain would grow after it had been kept seven years.

As the method proposed by Mr. Duhamel for the preservation of corn, by ventilation and kiln-drying, not only appears reasonable and practicable, but has, according to him, been confirmed by experiments, I have here given an extract from his book, as a hint to the reader, referring him, for farther satisfaction, to the original, where he will find draughts of the buildings, and instruments made use of for this purpose.

Mr. D U H A M E L on the Preservation of Corn.

After having expatiated on the necessity and use of preserving corn in granaries, especially in France, where they are frequently in danger of famine, he proceeds as follows.

Z 2

Consid-
eration des
grains
1753.
To Page 12.

§. 3. In discourse with several notable farmers on country affairs, they seemed to agree, that a brick granary, except lined within-side with boards, would damp

To preserve corn according to the common method requires immense granaries which must be very dry, and built very strong, and, in those who have the care of them, great assiduity, skill, and probity are requisite; and we may conclude that the want of such edifices, and the difficulty of procuring proper persons to have the care of them, is the reason that magazines are not so much multiplied as could be wished.

I hope, says he, by the method I shall propose, to obviate all those inconveniencies. By these means a large quantity of corn will be preserved in a small compass, without danger of heating or fermenting; it will be secured from the depredations of animals and insects; and you need not fear even the incapacity or infidelity of those that are employed to take care of it; and all this without trouble, and at a very small expence. But before I propose my method, I shall describe the common practice of the provinces about Paris. The inconveniencies will be easily perceived, and you will be better enabled to judge of the great advantages arising from the method I propose.

Page 14.

When corn is laid up in a granary with intent to be kept a great while, the custom is to spread it only eighteen inches thick; 'tis true that, when it is old and very dry, the granary perfectly free from moisture, and the joists strong enough to support the weight, they may lay it somewhat thicker; but as we must fix on some determinate height, I chose this as the most common in large granaries. That the corn may not lie against the wall, they generally have a passage of about two foot all round. By this means they prevent the corn from being lost by running down the chinks that necessarily happen at the edges of the floor; they remove it from the holes made by rats and mice; they take care to prevent the dirt, which falls chiefly from such places, from mixing with the corn; they remove it from all moisture that may come from the sweating of the walls, or from any defect in the roof: lastly, the grain is more exposed to the air, and they contrive to leave a passage for it's reception. This is the custom generally observed, and probably has been found necessary.

Page 15.

The corn being thus removed from the walls, the sides of the heap make a declivity, which as far as it reaches, contains but half as much as if the sides of the heap were perpendicular, and this makes a loss of near a foot all round the granary; lastly, they leave a space at one end, sufficient for turning the corn; all this

greatly

damp and moldy the corn that lay next the sides, especially on the weather-side, which they called the south-west side; — they gave instances of some farmers who had suffered by it; — and a carpenter

greatly reduces the contents of the granary, and, to make it more clear, I shall give an example.

Suppose a granary eighty foot long and twenty-one broad, which makes one thousand six hundred and eighty foot superficies: you must take off for the passage and the sloping of the corn, at least three foot on each side, which makes six foot for the whole length, or four hundred and eighty square feet, which being taken from one thousand six hundred and eighty there remains but one thousand two hundred, from which you must take at least fifty foot for the space necessary for turning the corn and the passage at the other end: so that you can reckon only on one thousand one hundred and fifty foot square of room, which at eighteen inches deep will contain one thousand seven hundred and twenty-five cubic feet of corn, which will weigh about ninety-two thousand pound.

It appears from the foregoing example what immense buildings are necessary for a large magazine, and the vast expence that must attend the building and maintaining them. The buildings at Lyons called les graniers de l'abundance, of which we shall speak hereafter, will furnish a further proof of it.

It follows then that it will be of great advantage to lay up a great quantity of corn in a smaller compass, and we shall make it appear in the following discourse that it may very easily be done.

Corn, tho' dry to appearance, contains a great deal of moisture. I have put new corn in glass bottles well stopped: the moisture that came out of it appeared on the inside of the bottle, and the grain grew mouldy. At certain intervals, in the year 1745, I weighed a quantity of wheat of the last harvest, I exposed it for twelve hours to the heat of a stove or kiln, which raised Mr. Reaumur's thermometer to fifty degrees: it lost an eighth of it's weight, and yet was only dried; for being sowed it came up.

In 1744 I put some wheat, and other grain, of the harvest of 1742, into a stove heated so as to raise Reaumur's thermometer to 38° which is 8° higher than our hottest summers; both the sorts of corn, that were used for the experiment, in twenty-four hours were found to be diminished $\frac{1}{32}$; they were put again into the stove, which was heated to 51°, and in twenty four hours after were diminished nearly $\frac{1}{16}$; besides that which was weighed, there were some separate parcels

carpenter being there did attest it.— They said that mice would neither meddle with barley nor peas, if they could get any thing else.— They said, it had been

both of new and old corn set apart, to try what degree of heat it would bear without destroying it's vegetation. I sowed some that had suffered $12\frac{1}{2}^{\circ}$, some 38, and some 51 : and in all these cases, the new came up, but the old did not.

It is remarkable that, be it never so hot during harvest, the sheafs that lie at top of the heap are harder to thresh than those that lie at bottom, which is the consequence of moist vapours that rise from the corn.

Page 20.

If you put a large heap of corn in a granary, and do not stir it for a considerable time, or if you only fill a barrel, after some time, upon running your hand into it, you will find a sensible heat in it and a small moisture ; some time after it acquires a vinous smell, then turns sour, and at last moldy ; in a word it ferments, and is no longer fit to make bread, and sometimes even the fowls will not eat it.

It is to prevent fermentation that they lay it so thin, as eighteen inches, in the granaries, and turn it so often.

If it has been a wet season, and much rain fallen during harvest, they are obliged to turn the corn every three or four days ; but when corn is well conditioned, and the first year is passed, it may be sufficient to turn it once a month ; some turn but once a fortnight in the months of May, June, July, and August.

These are the expences, and the care that attends it is not inconsiderable, especially in summer, when the farmer has so many calls and occupations in the field ; nevertheless the proprietor must keep a strict eye upon his workmen ; for, besides the frauds they will commit, especially when corn is dear, they frequently stir only the top of the heap, so that the bulk of the corn which you think has been turned was never stirred at all.

Page 22.

Whoever can save these expences and cares, will render the preservation of grain much more easy ; and that is what we hope to shew in the following work.

Wheat is not only the nourishment of men, but many other animals are particularly fond of it. Nobody can be ignorant of the great waste that is made in granaries by rats, mice, and birds : it seems possible to defend it from these depredations by carefully stopping all passages, laying snares, poison, &c. but all these precautions will not suffice to prevent the pillage of these animals, who, besides what they eat, waste a great deal by means of the holes they make, through which the corn runs down, and it is lost.

been commonly asserted that mice would not touch wheat, where they could have oats; that many therefore would lay oats in one half of one side of their

loft. If the farmer makes holes for cats to go in at, the birds will take the advantage of them, and the cats themselves contribute to the waste by their excrements, which form heaps of infected corn.

Our labour, therefore, will not be lost, if we can arrive at a method by which we may have nothing to fear from these animals, and that without the use of cats, snares, poison, &c.

One of the greatest obstacles to the keeping of wheat, is the insects that breed in it: the chief are the weevil and moth. How often have the naturalist, the philosopher, the lovers of the public good, endeavoured to search out means of exterminating these insects, which increase sometimes to such a number as to devour a great part of the grain? All the methods that have been proposed have either proved ineffectual, or impracticable; the only one used in our province is the passing all the corn over a wire screen; part of the weevils, and the corn they have damaged, falls through into a copper vessel, which they set under the screen; but this tedious and expensive operation, only diminishes the evil without curing it; instead of which we hope to propose a method, by means of which you will have nothing to fear from any sort of insects, and that without charge or trouble.

The business is, in order to render the preservation of corn Page 25.
easy, first, to keep a great quantity in a small compass; secondly, to prevent it's fermenting, heating, or contracting any ill taste; thirdly, to guard against the rapine of rats, mice and birds, without exposing it to the damage occasioned by cats; fourthly, to preserve it from mites, moths, weevils, or any other insect, and all this without charge or trouble. Let us see if all this may be brought about, and give an account of the experiments we have made on the subject.

We caused a case or little granary to be made, of oak plank two inches thick, forming a cube of five foot every way; at six inches from the bottom we made a flooring, or second bottom of lattice work, placed upon joists of five inches thick; covering it with a strong canvas; and this little granary was filled quite full of good wheat; it contained ninety-four cubic feet, weighing five thousand and forty pounds.

Before we proceed any farther, it is proper to observe, that such a granary of twelve foot cube will contain one thousand seven hundred and twenty-eight cubic feet of corn, whereas the

their barn, and wheat in the other half of the same side, but they themselves never found but that the mice would eat heartily of both.

THATCHING.

granary we instanced in the beginning of this work. which had one thousand six hundred and eight square feet of superficies, could contain, in the common method, no more than one thousand seven hundred and twenty-five cubic feet of corn.

Page 27.

This is an immense saving both of room and expence, since for about sixty pounds you may build such a granary of brick or stone fifteen foot square and twelve foot deep, which will contain two thousand seven hundred cubic feet of corn; whereas a granary, in the common form, to contain that quantity, would cost eight or nine hundred pounds.

The little granary being filled quite full of corn, is to be covered with good oak planks, so closely joined, that neither rats, mice, or even the smallest insect can get in, leaving only some vent-holes, with trap-doors, or covers fitted very exactly to them, of which we shall speak hereafter.

Thus is our corn deposited in a small compass, and perfectly secured from rats, mice, birds, and even insects, provided there were none before in the granary, or among the corn; but if there should, we shall hereafter prescribe a method of destroying them.

Page 29.

It is notorious in this climate, that corn laid up in great heaps will soon ferment and spoil, to prevent which it is necessary to force out the tainted air, and supply it's place, from time to time, with fresh, in short to establish a current of air, which shall pass through the corn, and carry off the dampness.—For this purpose we proposed to make a false bottom of lattice work covered with coarse canvas (but if it were for a large granary, wire in the manner of a sieve might be better) through which the air might pass, and be forced out at the vent-holes at top.

Page 31.

This purpose is answered by bellows, and the most proper for the purpose are those contrived by doctor Hales (as described in his book called a Description of Ventilators) being constructed without leather, or any other matter that is liable to be destroyed by vermin.

Page 35.

A large pair of these bellows being so fixed as to receive the air from without, and convey it between the bottom and false bottom of the granary, when you would ventilate the corn, open the vent-holes at top, and work the bellows, which will drive the air through the whole body of the corn with such force as to make the dust fly out of the vent-holes, and when confined to one small opening will blow up some grains of corn a foot high.

Every

T H A T C H I N G.

§. 1. **I** Was telling a Dorsetshire farmer how useful ^{Of reeking} it was to have wheat-straw saved against ^{straw.} an unforeseen occasion, and for which it was often wanted.

Every stroke of the bellows conveys two foot cube of air into the granary, which, at the rate of four hundred and twenty strokes in five minutes, will supply eighty thousand six hundred and forty cubic feet in a day, that is to say in eight hours working. Page 36.

The proportion of air in a heap of corn is found by calculation to be about $\frac{1}{11}$, but supposing it even a third part, it will be changed two thousand six hundred times in a day, with one pair of bellows; but my granary has two pair.

The corn I chose for this experiment was of good quality: I ventilated it, not more than six days in a year, without the help of fire, which was sufficient to keep it so well that the best judges allowed it to be as good as could be. Page 39.

When the bellows had not been worked for several months, the corn was allowed, by good judges, to look and smell perfectly well, but they objected that it did not handle well, that is, that it had some little dampness in it. The bellows were worked for half a day, and that objection was entirely removed.

In hot countries corn may be preserved for a long time by being deposited in a vault or cistern, so closely stopped that the air can have no access; but experience shews, that this method will not succeed in our climate, the sun not having power to exhale moisture from the corn sufficient to prevent it's fermenting, when laid in a large heap; and this is further proved by several experiments of corn dried in a kiln, which, tho' it's weight was very considerably diminished, did not lose the vegetative quality, but grew very well. Page 49.

It follows from these observations that it is necessary to take away the superfluous moisture, and reduce our corn to the same degree of dryness as that of the hottest countries, in order to preserve it in great bodies. Page 51.

EXPERIMENT on ninety-four cubic feet of wheat (not dried) which was preserved by ventilation only, above six years. Page 55.

In the month of May, 1743, ninety-four foot of wheat was put in one of the little granaries beforementioned; it was of the harvest

wanted.—He allowed, it was very good husbandry, and added that he commonly used to reek his wheat-straw, which would take no damage for a year

harvest 1742 and of an excellent quality, perfectly clean, and so dry, that it lost only $\frac{1}{8}$ of it's weight by a small quantity of it for a trial being dried on a kiln with the heat at fifty degrees of Reaumur's thermometer. This wheat was well cleaned from dust, and deposited in the granary without being dried by fire.

The first three months it was ventilated for eight hours once a fortnight, the rest of the year 1743 and all 1744 it was ventilated once a month, all the year 1745 and part of 1746 but half a day once a month, and after that but once in two or three months.

In the month of June 1750 the granary was emptied, and the wheat was found to look and smell very well, but felt a little rough in the hand, because not having been moved for six years, the little hairs that are at the extremity of the grains, and the particles of the bran were roughed up; but after passing twice through the wind-screen that objection was entirely removed, and it was found by the bakers, pastry-cooks, &c. to be perfectly good.

This was corn of eight years old, seven of which it was preserved in the granary without any sensible diminution, and without any damage from rats or other animals; it cannot be said without expence, because there was a man employed from time to time in the ventilating, but it is very easy to reduce that expence almost to nothing, as will be shewn hereafter.

Page 62. **EXPERIMENT** on seventy-five foot of new wheat extremely moist, grown, and that had already contracted a bad smell.

The harvest 1745 was very rainy, and all the corn grown in the ear; in the common granaries it was always in a state of fermentation, tho' laid but a foot deep, and turned every four or five days.

Seventy-five foot of this grown corn, which smelled very ill, and was so moist as to wet the floor of the granary where it lay a few days, was put, in this condition, and without being dried, into one of our little granaries with small hopes of success.

As the corn was very hot when put into the granary it was ventilated three or four times the first week, once in eight days during December and January, and, as it had then lost great part of it's bad smell, from that time till June once a fortnight.

Then

THATCHING.

363
933

a year or two ; and, if there was no occasion for it, it would make litter and dung at last ; therefore, as wheat-straw in some years proves very short, or blighted,

Then perceiving, by running one's hand into the top of the heap, that it heated, we concluded it was going to be entirely corrupted, which determined us to empty the granary ; but, when we had taken out about a foot of the top, we were greatly surprized to find the rest fresh, having very little bad smell, and drier than that preserved in the common granaries. So that we regretted having emptied it.

The reason why the top was the worst was, the moist vapours being always forced upwards in ventilation ; and we apprehend if instead of emptying the granary it had been ventilated oftener, the moisture that was at top might have been dried away.

This experiment teaches us one thing of importance, which is, that in this sort of granary the top of the heap is most subject to heat, so that if the grain taken out of the vent-holes is in good condition, you may conclude the rest to be still better.

EXPERIMENT on five hundred and fifty-five foot of wheat of the year 1750 (which was very damp and difficult to preserve) put into one of our granaries without being dried on a kiln. Page 69.

It must be allowed that in this method it is very material to clean the corn well before it is put in the granary, because it is impossible to do any thing more to it till it is taken out for sale, but above all you must be careful to clear it from smut or blighted grains ; for we find, by experience, that they will communicate a bad smell to the whole.

This five hundred and fifty-five feet of wheat was so well cleaned, that, tho' at first it had $\frac{1}{2}$ part of smut or blighted grains, there remained scarce any appearance of either when it was put into the granary, only a light dust that it was impossible to get rid of, on account of the moisture of the grain, which made it adhere too fast to be removed by screening.

This wheat so well cleaned was put in one of our granaries, which had the bellows moved by a wind-mill.

There was no want of wind during the years 1751 and 1752, and, as it required neither expence nor trouble, it was often ventilated, which preserved it very well, and not only dried it, but also cleaned it, in a great measure, of the bad smell it had when it was put in.

When

blighted, in neither of which cases it will be fit for thatching, so it is prudent to save and reek what one can spare, when it proves long and good.

§. 2. It

When it was taken out it was very full of a fine dust, which separated from the grain in proportion as it dried, but, after having past the wind-screen, it was found to be very good, and was bought by the bakers at the top price of the market.

Page 72.

By this experiment it appears, that very moist corn, which has a great disposition to ferment, may be preserved in these granaries by ventilation only; but he thinks it not safe to trust to this sole precaution; because, if a calm should happen about the month of June, so as to rob us of the use of our ventilating-mill, at a time when all nature is disposed for fermentation, the whole might be spoiled.

To prevent which, he proposes two methods.

Page 72.

THE FIRST METHOD

Is to keep corn near a twelvemonth in a common granary, during which time you will have opportunity to use all means of cleaning it, by which operations it will lose so much of it's moisture, as to be perfectly fit for the granary of preservation.

This method will answer for such as desire to preserve the produce of their own lands only, and are already provided with a common granary: but those that would buy a large quantity of corn, when the price is very low, for the chance of selling at a better market, must follow the

Page 75.

SECOND METHOD.

You must have a common granary sufficient for cleaning the corn before you put it in the granary of preservation; but as soon as it is well cleaned you must dry it in a kiln (which is hereafter described) for by this operation, which is neither troublesome nor expensive, you will in a very little time dry it, more than if it had lain in a common granary for a year. After which operation you may put it in the granary of preservation without any fear, having only once passed it through the wind-screen to cool it, and clean it from dust; as will appear by the following experiments.

EXPERIMENT

§. 2. It is of great use to have a reserve of bar-^{Oat-straw}ley-straw, or wheat-straw, to fling some loads of ^{of no great} either on the peas, and barley-reeks, to secure them ^{use.} when they are obliged to lie a long time unthatched ;

EXPERIMENT on ninety foot cube of fine wheat, which was Page 76.
preserved without ventilation, after having been dried in a
kiln.

This wheat, tho' very full of smut and dust, was so well cleaned as to have no fault remaining but dampness ; it was dried in a kiln, by which it lost a little disagreeable smell which it had before ; when it was thought to be sufficiently dried, it was deposited in one of our granaries of preservation, which had bellows adapted to it, but there was no occasion to make use of them.

It appears by the foregoing experiment, that wheat well cleaned and dried need not be ventilated.

EXPERIMENT on seventy-five foot cube of small wheat, Page 78.
mixed with smut, which had been dried in a kiln.

Our different screens cleaned the large wheat perfectly, but with all our care we could not free this small wheat from smut, dust, &c. of which much remained, and the kiln did not clear it from the bad smell it had contracted.

Frequent ventilation would undoubtedly have taken away that bad smell, but this experiment being to try the effect of the kiln only, we determined not to ventilate, unless there was great danger of it's corrupting, which did not happen ; but yet the bad smell increased so much that we were obliged to kiln-dry it again after it was taken out of the granary, and to screen it several times, by which means it made tolerable good bread.

This experiment shews, first, how necessary it is to clean the corn well before you put it in the granary of preservation, and that, in some cases, both ventilation and kiln-drying are necessary ; secondly, that corn, which has contracted a bad smell, may be cleared of it by the kiln and wind-screen.

Having found by the foregoing experiments that good corn, Page 80.
well cleaned, and properly kiln-dried, may be preserved without ventilation, and that good corn tolerably dry may be preserved by ventilation only, we conclude it must be most advantageous to join both methods, especially for large magazines.

EXPERIMENT

as for oat-straw, it is of no great use, unless to cover an oat-reek, or peas for fattening hogs, or corn for fowls.

§. 3. When

Page 80. **EXPERIMENT** on eight hundred twenty-five foot cube of fine wheat lightly kiln-dried and ventilated:

This wheat was of the year 1750, and consequently but of a middling quality; after being well cleaned, and lightly kiln-dried, it was put in the granary of preservation about seven foot deep, which granary had bellows worked by a wind-mill.

This corn had a bad smell, which was not entirely dissipated by the kiln, but was entirely cleared of it by ventilation; it was not only well preserved, but so meliorated, and became of so good a quality, that the bakers preferred it to all other, and bought it two-pence per sack dearer than the same wheat preserved in the common method.

Page 82. It is certainly most advantageous to unite both methods, not only because it is the most effectual in preserving the corn, but it is also the least trouble and expence: for to kiln-dry it sufficiently to keep without ventilation requires a large fire and long attendance, and to preserve it without kiln-drying will require very frequent ventilation, whereas by joining the two methods you render both very easy, less expensive, and the success more certain.

In all these experiments we have never suffered any thing by moth, or weevil, tho' the common granaries were greatly infested with them at the same time; this is a good prognostic, but we must not conclude from hence that this method will absolutely prevent the mischief: it may be supposed, that the care we had taken, in these experiments, to clean the corn, had entirely freed it from them, and may be objected that this great care cannot be taken in large provisions, and that, should any get into the heap, they would be more dangerous, inasmuch as they would not be disturbed for so long a time; these reflections determined us to make the following experiment.

Of the M O T H or W O R M.

Page 84. The moth lays it's eggs on the corn, the eggs produce a worm or caterpillar, which feeds on the corn, and spins a silky web all over the surface, so as to make a crust sometimes of three or four inches thick, which is entirely spoiled, beside the bad smell it communicates to the whole.

In

THATCHING.

367

§. 3. When straw is heaped up together in order to be helmed, it is fit at the time of wetting straw for helming that there should be two persons to keep the heap close together by beating it, whilst one flings water on it; otherwise, if the straw lies hollow, the water will run so fast through it that it will not take wet.

Of helming
for thatch-
ing.

§. 4. It is found by experience, that in thatching barns, &c. it is more profitable to bind on the thatch with pitched ship-cordage untwisted (which is sold at market-towns) than to bind it on with withs, not only because the cords bind faster, which

Of binding
on the
thatch.

In winter 1746 we collected all the wormy crust (from our ordinary granaries) which was very thick, the moths having been very numerous the preceding summer: these crusts were broke and screened, and what grain could be got from it (which undoubtedly was impregnated with the eggs of the moth) was put in one of our granaries which contained seventy-five foot cube, and ventilated from time to time all winter,

Page 87.

About the end of May if you opened the vent-holes at top, a vast number of moths flew out, which shewed they did not like their situation.

In the month of June 1747, the granary was emptied; the moths and worms were all perished, and there was found only a thin crust on the top, of about $\frac{1}{8}$ of an inch thick, and the corn had lost part of the bad smell it had when put into the granary, insomuch that it sold for the current market price.

Of the WEEVIL.

The weevil is of the beetle kind, it devours a great quantity of corn, old as well as new, but does not communicate any bad smell to it, as the moth does; it will endure the heat necessary for kiln-drying, and is numbed but not destroyed by intense cold, they are generally found collected in heaps, which feel very warm, which warmth probably is necessary for hatching their eggs, and if so, they will not be in a condition to propagate their species in our granaries. No smoke will destroy them but that of sulphur, and that gives a bad smell to the corn.

Page 89.

In the month of May 1751, we put some weevils into our granaries, and when it was emptied in August 1752, we found none.

Page 95.

is

is much to be regarded in places exposed to the wind; but because they also endure longer: this method likewise saves the time of twisting the withs, as well as prevents the damage done to the young coppices in cutting them, and often unseasonably too: if you please, the same person who thatches may also bind on the cords, which saves one labourer's hire, but it is thought to be better that a labourer should be withinside to bind, because he can do it stronger, which is of great consequence.

Of helming
long before
thatching.

§. 5. I told Mr. Hillman near Andover that the mice got into my wheat-staffold, tho' it was impossible for them to come up by the staffold. — He asked me whether I did not make up the helm some time before I thatched with it, for, if I did, the mice might very likely be carried into the reek.

Of wetting
the helm to
top reeks.

§. 6. It is very good husbandry to top hay or corn-reeks with well wetted helms, that they may be well sparred down, and the spars will then stick well in them; whereas, if you top with dry straw, the top will be liable to be blown off, because it lies loose and hollow, nor will the spars stick fast in dry straw.

Of thatch-
ing with
oat-straw.

§. 7. I was thatching my cart-house with oat-straw; it was March the 14th (anno 1703) — my oats not having lain long enough in swarth did not thresh clean: the thatcher told me, he feared abundance of them would grow in the thatch, and would damage it by rotting after they had grown, and stop the rain from running off, especially if a wet season, which would make the oats grow, should ensue, but, if it should prove a dry spring, they might be malted; said he, had this straw been laid on in winter, the cold would have killed the oats in chitting, and so the damage had been prevented.

MALT and MALTING.

§. 1. **F**ARMER Sartain and others skilled in malting do allow, that barley, as soon as it is housed will work very well, and make very good malt, provided it took no wet in the field, after it was cut, but if it did, they say, it will not work well.

Barley as
soon as
housed will
malt well.

§. 2. Mr. Slocock of Newbury, a maltster of long experience, informs me (it having been a dry season for a good while) that the forward barley, which was already cut, and carried into the barn, was dried up with the drought, and would not therefore make so good malt as that which should be housed after rain: it is true, said he, such dry barley will raise an increase and smell well, and will put forth a beard, i. e. a root, but it will not put forth a spear to run half the length of the barley-corn, and so cannot make good malt, because the hardness of the rind binds up the spear from shooting. — So, it seems, a rain on dry shrunk-barley not only thins the rind, but loosens it also from the flour, that the spear may the better shoot up between. Mixt barley, that is, such, of which some was brought in drier than the other, will never make good malt; it will not come all together; it is the same with old and new corn.

Barley
very dry
when hous-
ed will
not malt
well,

§. 3. Barley, when first cut, before it has sweated in the mow, will come as well as afterwards, but whilst it is in it's sweating it will not come at all.

When
sweating in
the mow it
will not
malt.

§. 4. Discoursing with Sampson Cress of Holt in Wiltshire, an observing maltster, about the art of making malt, I told him among other things, that I found the lighter the kiln was loaded in drying off a kiln of malt the sweeter the malt would be; for should the kiln be loaded some six inches deep, nei-

Of the
malt-kiln
and of
changing
the water,

ther the flame nor the smoke would pass off well, but the malt would be suffocated with smoke. — He replied, that he believed, if my kiln was choaked with such a thickness, it could not have a good draught, but must be a faulty kiln; for, said he, a good kiln ought to have such a draught as to roar like waves on a river, or like a furnace under a brewing copper. — Again, — I told him the opinion of several judicious maltsters about changing the water in the cistern while the barley is wetting, especially if it be coarse or cold, because a slimy water would run from it. — He agreed, that in the fore-end of the year, before the barley had taken its due sweating, be the barley never so good, it must be very proper, because the water such barley is steeped in will be foul, and the giving it a second wetting or running of water must needs cleanse it, and tend to the making sweet malt. — In the same manner, said he, it is likewise proper to do by barley wetted at the latter end of the year, towards spring, because, when the weather grows warm, water soaking barley forty-eight hours will grow sour, and begin to corrupt. — The next day I talked with William Sartain of Broughton, and Mr. Whatly of Bradford, Wilts, who are both of them maltsters; they admitted it to be advantageous for the corn in the cistern to change the water at any time, except in the middle of winter, when the weather was too cold. — As to the quick draught of the kiln, and its roaring (as above hinted) that, they said, in many malt-houses depended on the corner the wind sat in, and on the opening of doors or windows; that though such fierce fires were best for high-dried malt, yet a gentler fire was best for the pale-dried malt.

Of drying
the malt on
the floor.

§. 5. The two maltsters mentioned in the last observation agreed, that you cannot keep barley too backward

backward on the floor, nor give it too much time, in case it neither harles at root nor spear, and that, receiving it's drying on the floor, it would require the less fire and wood.

§. 6. The hill-country barley has a much finer coat, and consequently more flour than the barley of the vale: the hill-country barley will be watered or wetted in four tides, whereas the vale-barley requires five, and the hill-barley, when it is watered, will in it's coat look as clear as the horn of a lanthorn.—— Note, every day is a tide, and every night is a tide.

§. 7. On observing that the straw-dried malt made at Crux-Easton wanted the fine elegant flavour that was common to such malt made at Holt, &c.—— I discoursed Sampson Crefs about it,—and he suspected two errors in my method of wetting; first, that the water I both wetted my barley and brewed my malt with was not agreeable, for, if that was wanting in either case, though I might brew very sound drink, yet it would want that fine flavour I complained to be deficient: though, said he, I have a well, yet I fetch my water both for wetting my barley, and brewing my malt, from Staverton-river; for pond, or well-water, that is either foul or unpleasant tasted, will want the spirit when made drink of, and he wished me to use chalky water out of my well for both uses, for that is the water, said he, I would use if I had it.—— Secondly, it is possible you do not change your water often enough at wetting; for it is common for the first water, to come away slimy, like ox-drivel, as you may find by taking up some of the barley out of the cistern, and the water will taint and grow sour, if not changed during the five tides; which will give an odd taste to the malt, or at least rob it of it's flavour; you should at least change the water once, especially in the two warm seasons of making malt, viz. in the spring, and at

autumn, for then the weather is warmer than in winter, and will sooner taint; but if you should change the water three times in warm weather, you will find it the better, and you will do well to have a hoghead of water ready to run into the cistern as soon as the former water is let out, because the barley by lying close may be apt to heat. — He said, he finds with him a hoghead of water will wet a quarter of malt.

In the spring, and at autumn, when the weather is warm, he thinks four tides enough, because the water being then warmer than in winter, four tides will penetrate more than five tides in winter.

He said, in case barley would not work well, because it was coarse and cold, he gave it six tides, and changed the water after the third tide; otherwise it would be slimy before it could be flung on the floor, nor would it without so many tides take water enough to come * suant; — therefore, it is a great error in my maltster in such case to give barley only four tides, as I have found he does.

* kindly,
well.

Of the
quantity to
be wetted
in propor-
tion to
your floor.

§. 8. I proposed to my maltster, to wet but three quarters of barley at a time, that it might have longer time on the floor, lest, by wetting more, which would require more room, one heap should press too fast on the other; — but he was against it, and said, it was best to wet as much as the floor would carry, which was four quarters at a wetting; for, said he, the more outsides you make the worse the barley will work; (as it stands to reason it should) for the outsides which lie to the air, never work so well as the inside, and the more heaps you divide your quantity of barley into the more outsides you make.

Not to heap
up the
malt, that
it may heat
before dry-
ing.

§. 9. I asked William Sartain, whether he approved of the custom of flinging up the malt from the floor into an heap before the kiln, and letting it heat before they dry it; he said, by no means; but, said

he, it is an old way, and they did it because it's being heated by so doing would forward it in the drying, and save fuel, but it makes it high coloured. Whatly says, it will both give it a higher colour, and make it bite freer, i. e. shorter, but he does not, he says, use it. Sampson Cress says the same, but condemns the practice. It was an old way among maltsters, but they have found it to be wrong. Whatly says,—some used to let it take heat till one might almost roast an egg in it, but surely, says he, that must make the drink apt to turn sour.

§. 10. In the spring, and at autumn, the barley will be apt to come rugged, i. e. put forth a single root at a time, instead of pushing forth all it's roots, in a manner at once: this is a fault:—in such case the forwardest root will be apt to draw all the substance of the flour away, and rob the rest, and prevent them from shooting forth, and so you can never have good malt.—To prevent this inconvenience, you must turn the heap often, and give it air, and spread it thinner, in order to keep it cool; which will check the tap root from running out so hastily, and give the other roots time to come on; without which you cannot make good malt.

§. 11. If you are desirous of having your drink in the greatest perfection, I would recommend it to you to have regard to the following observations;—First, to take great care that your malt be well screened, that being never thoroughly done by the maltster; and therefore ought to be done over again by you; for if you keep it, not being exceeding clean from dust, and all manner of foulness, it will in a little time decay and corrupt, and will give an ill taste to your drink, nor will that fine well, but be muddy.—Secondly, to let your malt settle five or six days in the sack after you have ground it; for it will then much better fall to flour, and grow dry,

A a 3

whereas

Of turning
the malt
often at
spring and
autumn.

Rules for
managing
malt in or-
der for
brewing.

whereas otherwise it will be clammy, and the water will not dilute it^a.—Thirdly, the older your malt (but exceeding twelve months at least) the better; the time therefore for buying of malt is before any new barley can be threshed out; for after new barley comes to market the maltster will be mixing the new malt with the old, but old malt will go much farther than new.—Fourthly and lastly, let your malt be well dried; for slack-dried malt will not keep; for keeping it ought to be well dried.

Close pressing the malt a prejudice to it.

§. 12. October the 4th (anno 1712) Mr. Hillman, maltster, of Andover, visiting me, we discoursed about making malt: Mr. Hillman said, the act of parliament that laid the duty on malt was a general prejudice to it's being well made; for before the act the maltsters used to sling the barley out of the cistern or stone into the floor, and then cast it forward again, that the sour water might run off, and then sling it back into an heap, or a couch of only ten or twelve inches thick, that it might lie easy;—but now the maltsters, out of lucre of having the couch measure the less, thereby to lessen the duty, sling the corn out of the cistern as wet as possibly they can, that the weight of it may press it the closer together, and to that end they lay it in a heap or a couch of twenty-four inches high, without slinging it off for the water to drain away, whereby the undermost corn is pressed so dry that it is killed, and never works into malt, but * finnows; and by this means the sour water not running off gives the malt a sour and churlish taste, which never wears off.—The damage the undermost barley receives (as above described) from the close pressure of it puts me in mind of the common expression of the country-man who says, that when barley is first sowed it ought to

* molds.

^a This rule contradicted §. 19. — at least in pale-dried malt.
lie

lie easy, the reason of which he knows not, but observation and experience confirms him in it.--From hence, it may not be improper to borrow a hint how to account for the reason of it:--it seems to me, as some creatures, for example amongst fishes the eel, or the miller's-thumb, will live with less air than other fishes, so also it is with corn, amongst which some sorts of grain are easily suffocated and choaked, and the vegetable punctum saliens (or heart) stifled for want of a sufficient pabulum of air in it's tender infancy, when oppressed with heavy wet clay; whereas in more porous earth, which lies light, and whereby there comes a freer access of air to the seed, the vegetable progression is supported and carried on in the seed. — I think it may well be made a quære whether barley sowed in a pot of mold, and put into an air-pump, where the air is drawn out, would not rot and finnow, instead of growing,-- and whether, if the same experiment was to be made on barley and wheat put into an air-pump, the wheat would not spear out with the help of a less quantity of air than the barley, because we see wheat will grow under a closer, heavier, wetter, and colder earth, from whence the air is more excluded, than barley will do. — Thomas Beckley of Bourn, maltster, says much to the same purpose with Mr. Hillman, and that sometimes the keeping the barley longer in couch than ordinary for the exciseman's coming contributes to the souring the malt; and the close pressing it in the cistern, by the deepness of it, whereby it lies the harder, hinders it also from coming.

§. 13. An old and an experienced honest maltster did assure me,—that if the germen, or the spire-end of the barley, which runs between the flour and the rind, was not as high ascended between the rind as the root-end was put forth, such barley-corn was not fully malted, and that no more of the grain

To know
when bar-
ley is fully
malted.

would be converted to flour than as far upwards as the point of the germen ran, and that by biting the grain one might find the difference; for that part of the grain not malted would be hard and tough, and being ground would be fat, dauby, and clammy in the liquor, and would not drink it up.

My maltster sent me malt, which my butler was not pleased with; he said, there were many grains in every handful of it, which were not malted at all, and many grains that were but half malted, of which I might be satisfied, if I made trial in water; for the corn, which was not malted at all, would sink to the bottom, and the half-malted grains would swim an-end, like a fishing-quill.—I called for a basin of water to make the experiment, and found it to be true.

Of the increase in malting.

§. 14. The maltsters have frequently a bushel and an half increase in the quarter, when they do not screen the coomb well, but in the London-trade there is not above a bushel increase to be had, because for that market the malt must be made very * knot: if malt be sent to London, and be not made knot, it will heat, and the coomb fall off in sifting, and tumbling it out at the wharf, and then it will not hold out the measure it was sent for, which will occasion dissatisfaction between the factor and the maltster.

* fine, clean.

Of pale-dried malt.

§. 15. I find they agree, that pale-dried malt, if care be taken to give it its gentle heat with a soft fire, may be dried as hard as the highest-dried malt, though generally speaking the pale-dried malt is flacker dried; but in case time be taken in drying it well, they know not why it should not make as strong drink as the high-dried malt, and both the malt and the drink keep as long.

Of wheat and oat-malt.

§. 16. Mr. Edwards says, that he has used, and brewed with a bushel of wheat-malt, and twelve bushels of barley-malt to the hoghead to his very good

good satisfaction. — He also says, that Sir Robert Sawyer used always to put wheat, beans, and oats to his malt. — He likewise says, that a bushel or two of oat-malt to twelve bushels of barley-malt will ripen the drink much sooner; — and further, that oat-malt and barley-malt equally mixed, as many of the country people here use it, makes very pretty, pert, smooth drink, and many in this country (in Hants) sow half barley, half oats, for that purpose, and call it Dredge.

§. 17. 1696. Fern-dried malt is not of late years Of fern-dried malt. looked on to be so good as malt dried with other fuel, though some years ago it was in vogue, but people soon found their error: it used formerly to yield 2d. in the bushel extraordinary, but now it yields 2d in the bushel less. — It makes the ale taste maukish.

§. 18. If malt be burnt, the longer it lies by the better it will recover itself, lose its heat and look Of burnt malt's recovering by keeping. paler: I had some drink made of malt, that being rashed would have been quite spoiled, had it been used directly, but by keeping it a year and half by me it was so well recovered, that there was no loss in it. — Pale malt is best to be brewed as soon as it is ground, but the high-coloured malt is better for being kept a while after it is ground before it be brewed, because it is too hard to break to pieces, and molder in its flour, till the air by being imbibed has loosened its parts.

§. 19. I find by my own, and the experience of Of new and old malt. other observing maltsters, that for brewing drink malt is in perfection about three weeks or a month after it is made; for by that time the fire will be out of it, and it will then be fullest of spirit; whereas the more it slackens afterwards the more the spirits go off, and with them the strength of the smell abates, as may easily be perceived. — Therefore, though
malt

malt takes least damage kept in a great heap, yet I find they all agree, that one had better make October drink with new malt than with old, because if both years barley be equally good, the new malt will brew stronger drink than the old, but this more especially holds in pale-dried malt, because it may so happen that high-dried malt may be so scorched as not to be mollified, or have the fire enough out of it for brewing till many months after it's being made, and by long keeping that suffers least.

They hold that it is more profitable for the maltster to sell old malt than new, because, before it is flacked, and while but newly come from the kiln, much more goes to the bushel.

H O P S.

Of setting
the hop-hil-
locks at a
distance.

§. 1. ^a **M**R. Perdue, the greatest hop-merchant in Winchester, says, he sets his hop-hillocks at double the distance others generally do, and that he is sure he is a gainer by it ; for thereby in poles, and otherwise, he is but at half charges, and has as good a burden of hops as other people ; for the sun having power to shine through the poles, and to strike it's heat to the bottom, brings blossoms from the very bottom, the sap being checked and dried up by the sun, whereas, when the poles are set thick, the hops carry blossoms only at the top — Quære whether the same reason holds not, for setting beans thinner.

^a Our author having but few remarks on hops, they, who desire information in this particular, may consult Mr. Miller's Dictionary, under the article *Lupulus*, where they will find a full account of this plant, with several curious experiments made by the Reverend Doctor Hales.

§. 2. Hops

§. 2. Hops that feel clammy are the best; there-^{Of choof-}
fore may be chose in the dark.^{ing hops.}

§. 3. The true virtue of the hop lies chiefly in ^{Of the hop-}
the seed, and not in the leaf, which but few under-^{feed.}
stand; they choofe the hop by the colour of the leaf,
whereas the brightest leaved hops are the worst sort,
because they are not full ripe, and consequently were
gathered when the seed was in the milk, whereby it
shrinks to nothing; but the hop in perfection has a
nut-brown leaf, and it's seed being full ripe has a
good pith; which is what gives the grateful bit-
ter, though the generality of people are ignorant
of this.

§. 4. Hop-poles for the second year ought to be ^{Of hop-}
sixteen foot long, the first year wanting none; ^{poles.}
the third year they ought to be twenty foot long;
after that twenty-five foot, and never longer. — If
the girt of a twenty-five foot pole be eight inches at
the butt-end, it is reckoned a compleat pole: ash is
better for poles than withy by five shillings in the
hundred, in the twenty-five foot poles.

G R A Z I N G.

§. 1. **I**T seems to me (as before hinted) that the ^{Jews skil-}
Grecians, Romans, Phœnicians, &c. de-^{led in the}
rived their husbandry from the Jews; for it is not ^{manage-}
to be supposed, but that Abraham, Isaac, and Ja-^{ment of}
cob, and his sons, who were such wise persons as ^{cattle.}
they are recorded to have been, and so conversant
in cattle, must be excellently skilled in that branch
of husbandry. See Gen. xxxiv. 5. — And that
Jacob's sons were wise persons may be seen by their
conduct before Joseph their brother. — That Moses,
who was excellently skilled in all the learning of the
Ægyptians, and afterwards kept his father Jethro's
flock forty years, must by means of his advantages
in

in education have made vast discoveries in the nature of cattle is most certain, and what converse the patriarchs had with all the eastern nations, whereby those nations might be informed, is well known.

Antiquity
of this
branch of
husbandry.

§. 2. Doctor Patrick in his comment on Gen. xxix. observes that Rachel's name in Hebrew signifies a sheep. — And Varro derives many ancient families from the names of cattle. Lib. 2. c. 1. De rustica. — And lib. 1. fo. 29. he says, the pastoral care was the first employment in the world, and that agriculture came in of later years. — It seems indeed that those names, that honourable families anciently assumed to themselves, were borrowed from the names of cattle, as thinking the pasturage of them more profitable than tilling the ground; — and we find of Jacob, notwithstanding his flocks were so large, that yet his provision of corn was but from year to year; for in the second year of the famine in Ægypt he wanted corn, so that it seems he thought it more profitable to trade in cattle, and their fleeces, than to go to markets with corn. It is to be observed that Rachel kept the sheep, as being an honourable employment, not but she had others under her as assistants and servants. — G O D himself is named the shepherd of Israel: sheep-shearing, not reaping of corn, was their greatest festival. See Patrick, fo. 506. — In the hot countries it appears, that their custom was to bring their flocks to the wells, and into shades, to drink in the heat of the day, and, when that was abated, to drive them to feed again, as appears from Genesis xxxix. 7. — It is yet high day, &c. See Doctor Patrick's Comment; and Cant. i. 7. — and Palladius in his Calendar says, that the cattle used to be drove out to feed in the summer evenings, when the dew first began to fall, so that then they used to tend their cattle late, and the morning dew was also taken by them,

them, which, and Virgil's saying, *Et ros in tenerâ pecori gratissimus herbâ*, is contrary to our practice; and see Varro, l. 2. c. 15.—Notwithstanding however what may have been conjectured by various writers, and the preference given by them to the pastoral charge, in regard to it's antiquity, it is plain from Genesis iv. 2. that and agriculture were near of the same date, for Abel was a keeper of sheep, and Cain, the elder brother, a tiller of the ground.

§. 3. Mr. Brown, in his *Vulgar errors*, fo. 41. observes, that if sheep have any black, or deep russet in their faces, they want not the same about their legs and feet;—that black hounds have mealy mouths and feet;—that black cows, which have any white in their tails, do not miss of some in their bellies, and if all white in their bodies, yet, if black mouthed, their ears and feet maintain the same colour.

Of the colours of cattle.

§. 4. That Jacob's sheep brought forth speckled lambs, on viewing the rods at the time of conception, is imputed by Patrick to the divine will rather than to the force of imagination; yet he owns, that St. Austin, and some others, imputed it to the operation of natural causes, and alledges the like thing done in Spain between horses and mares.—Lord Pembroke told me, it was common in Spain to cover a mare with a Turkish carpet, and to lay another before her, when they brought the stallion to cover her.—I have always observed, that it is a common expression, on seeing a party-coloured horse, to say, “He was begot on a common:” it being supposed, that there the mare might, at the time of conception, have several different coloured horses in view.—But no wonder that these arts are not mentioned in the *Rei rusticæ scriptores*, they not being practised by the Romans; for their endeavours were to avoid party-coloured breed, either in sheep, horses, or horned

Of party-coloured cattle.

horned cattle; for which reason they would not keep such cattle of any sort, of either sex; and it seems to me, that Jacob proposed to Laban the ring-streaked, spotted, and speckled cattle for his hire, not only as unlikely to proceed from the white cattle, but also as the cattle of less value than the white cattle; for in these countries, as has been before remarked, they did not affect cattle of medly colours, and, as it is likely, because they thought those cattle of the worse natures, as not having been created so from the beginning; all cattle at first being of one colour in the same individual, as black, white, red, &c. and the mixture of colours whereby their natures are weakened, arising from the copulation of males and females of different colours.

Cattle in low case not to be put into rich land.

§. 5. The stronger and richer the land is, the more must cattle be kept up to a good pitch; for, if on such land cattle are in the winter suffered to run to poverty, or are brought into it poor, they'll be liable to the yellows, and the blain, and most sort of distempers; for it is the same as if you should offer strong meats to weak stomachs, or to persons in a low state of health.—It was agreed by farmer Chivers, farmer Harding, farmer Earle, and farmer Stevens of Pomeroy (notable Wiltshire dairy-men) that cattle in good case, and in heart, would for a little while feed on the coarsest fodder, be it straw or hay, which cattle low in case, would starve before they would touch, and therefore such cattle have the weaker stomachs.

Observation on Virgil—Et ros in tenera, &c.

§. 6. Great cattle choose to feed with their heads from the sun both morning and afternoon, feeding a different way in the afternoon from what they did in the morning.—Our cattle in England, seem not to care to feed among the dew in the morning before sun-rise; but like to stay till the sun has begun to warm

warm it; so that it seems the saying of Virgil, —
 “ Et ros in tenerâ pecori gratissimus herbâ,” —
 should be understood in England of the dew after
 sun-rise; perhaps in Italy, where the days are so hot
 and the grass in the day-time roasted with the sun,
 the cattle may like to lick up the dew early in the
 morning, and doubtless in England our cattle vary
 much in their hours of feeding between summer and
 winter.

§. 7. I observe in the hill-country, that in sum-
 mer-time cattle covet to pasture on the highest part
 of the field, for sake of air, and go not down to the
 low part of the ground to feed, it lying close from
 the air, till towards the evening, when the bottom
 of the field is also cool; the oxen likewise, which
 come from the plough, and are hungry, will go up
 to the height till towards sun-set, though that part
 be very bare of grass. — My shepherd said, on a
 certain day, that he would drive my sheep into the
 road on the waste to feed, because the day was cool
 and airy; for, said he, if I drive them thither in a
 hot sultry day, they will not feed, but will lie in the
 rutts. — The reason for their doing so, as I conceive,
 is, because they find great relief by the stream of air
 which runs along the rutts, as in a channel, when
 perhaps no motion of air is sensibly to be perceived
 elsewhere.

Cattle
choose the
highest
ground in
hot wea-
ther.

§. 8. When cattle in summer-time go late to
 shade, and come out from shade earlier than ordina-
 ry, to go to feed, it is a shrewd sign their commons
 grow short.

Sign from
their going
to feed.

§. 9. Large cattle will taint poor ground with
 pasturing on it, and will make mamocks, that they
 will leave and not eat; when at the same time, in
 rich land, and a good pasture, they would eat up all
 the grass clean; and that this should be so stands to
 reason, because, at best the poor ground not being
 very

Of cattle
tainting
ground.

very toothsome, a little addition to it of unfavouriness, by pissing or dunging, will occasion the cattle to forsake that part, especially about June, when poor ground begins to fall off from growing; whereas in good sweet ground the taint does not near so much overcome the sweetness of the grass, and for variety's sake it may be pleasant and grateful to the cattle, there being still a considerable degree of natural sweetness left to recommend it. — In poor grounds, such as hill-country-downs, the sheep will feed them down close, notwithstanding the ill flavour of their tails: the reason for the sheep feeding them so bare and close is apparent; for, wherever they lay their tails, there is time for such part to outgrow the taint, the grass being always kept young, and tender, and in a springing and growing condition, which is not the case in poor hill-country ground set apart for pasture for great cattle, which must therefore be hained, so as to be raised to a good bite, for the grass that may be tainted in such pastures, is of a good length, and the greatest part that is above ground is tainted; when great cattle therefore are forced to eat it, they may be observed to walk along biting the tops of it; that is, such part as has grown up since the taint.

Of feeding
clover.

§. 10. In case you design the feed of the second year's broad-clover for your cows and horses, as not having provided new broad-clover for them, of one year's growth; such second year's broad-clover, designed for the support of your cows and horses, ought not, in our hill-country, to have been fed the first year, but with cows, and a few horses; for if such ground be fed with sheep the first summer, it will much damage the produce of the second year; because they will wound, and bite into the roots of the clover.

§. 11. It

§. 11. It had been a very dry and burning hot season for six weeks, during the latter part of April, and all May, (anno 1702) and I had an hundred sheep and three beasts fattening in broad-clover: I often thought my servants had neglected to drive them to water: for they had no water in the pasture: so, not trusting to my servants, I drove my fattening-cows myself, in the evening, to water, but could not persuade them to taste it, neither that day, nor the next: I also drove my sheep to water, and waited patiently on them half an hour, but could not persuade them to touch it. — I observed the dung of the sheep to be very moist; and fat, and pappy-like cow's-dung; whereas, when sheep feed in other grass, they are naturally very dry, and costive: from whence I infer, that the leaves and stalks of the broad-clover being so juicy, no cattle need so much water with it as with other grass, if they may not even do without any at all.

§. 12. Farmer Miles of Holt assured me, that about them, in Wilts, oxen and cows were in great danger of being swelled by being put into broad-clover, whenever any rain came, though it was dry when they were put in: they had also, he said, in those parts, lost sheep by putting them into broad-clover, and into green wheat likewise, in the spring. — I said, I had this spring (anno 1720) fed my wheat down with my flock, by putting them in for two hours in a morning, after they came from fold; and I had found no hurt by it. — He replied, he supposed that would do them no harm, but what harmed them was keeping them in longer, and letting them lie down.

§. 13. A farmer in my neighbourhood had like to have lost several oxen this year, (1720) by putting them into broad-clover, though he watched them: one of them being so much blown, that he thought

Cattle fed
in broad-
clover need
little or no
water.

Of cattle
swelling in
broad-clo-
ver.

Of letting
out the
wind from
a beast
swelled by
broad-clo-
ver.

thought he could not be saved, the farmer ignorantly struck the bullock with his pen-knife into the hollow place under the free-bone, under the loin, which was wrong, and the bullock died; whereas, he should have taken a pair of strong pinchers, and in that hollow place have taken hold with them on the bullock's hide, and have pulled it from the flesh with all his strength, and then have struck his pen-knife into the hide only that he had loosened, and not into the bullock's flesh, whereby his guts were hurt, but, instead of that, should have run in between the hide and the flesh, and a wind would have issued out strong enough to have put out a candle.—In case a bullock, not thus blasted, has a blain, do the same thing, by lifting up the hide in the same place, and then make but a small orifice, so as to thrust in a pen-knife only, and a great deal of wind will issue out.

I was speaking afterwards to an old experienced farmer on this subject, and he said, he had not in thirty years time lost a cow by broad-clover, nor did he think it more dangerous than other grass, unless cattle came hungry to it out of the straw-barton, or were very poor in case; for then they would know it unreasonably, and it was very gross and windy; but cows that had the same spring been first in other grass, would not be very greedy of it, nor would, in that case, over-fill themselves; for they will eat any grass of the field before broad-clover.

I believe broad-clover is not so apt to hurt cattle on our dry hills as on the deep lands.—I also believe, the thicker it is sowed it is the less apt to hurt because it runs the finer.

The reason, as I conceive, why broad-clover is apter to blow a cow than a horse, is, because a cow licks it in with her tongue, at a greater length, and swallows it larger than a horse does; for he chews it
more,

more, as not chewing it over again as the cow does in the cud, and so it goes first down into the cow's stomach more gross, and with less of the salival juice to correct it than that which the horse swallows down has.

Another farmer of my acquaintance in Wiltshire had two beasts died with the rise of grass, by putting them into the aftermoss of his mead, which was very luscious, it having had a mighty quick growth occasioned by warm rain; and his cattle having for some time fared hard, they eat so greedily on their being first put into the aftermoss, that they quite choaked up their first stomach, called the farding-bag; for, upon opening the cows, that stomach was found full of raw indigested grass.

Mr. Bachelour of Ashmonsworth, and farmer Crapp, and farmer Biggs, discoursing upon broad-clover, farmer Biggs said, by mixing it with hop-clover, he had never lost a cow in his life; and so said farmer Crapp.

§. 14. The summer, anno 1717, being showery, the hop-clover came up thicker than ever I knew it, and grew to that height among the barley, as, at harvest, to flower; and we were forced to turn the barley-swarths, on account of the great quantity of hop-clover that we unavoidably cut off by the scythe with the barley.—I hoped therefore, that so great a bite of hop-clover, as my fatting-oxen might have after harvest, would bring them forward, they being well advanced in flesh before; and the hop-clover being sweet, I had great expectations from it; but for a fortnight I could only keep my oxen to hold their flesh, and then for another fortnight I found they lost flesh, though the bite of the clover did not so abate, but that it seemed thick enough to support them: my working oxen also filled themselves very well for near a fortnight; but when the head of the

On feeding
oxen with
hop-clo-
ver.

hop-clover was taken off, they fell off their flesh. — My ox-hind said, the cattle were forced to pull up so much of the barley-stubble with the grass, that it greatly abated the goodness of it. From hence for the future I may learn experience, and know how far I may depend on such hop-clover for fattening my working oxen.

Cows, sheep, and all sorts of cattle, will choose rather to feed on broad-clover, if it be kept down pretty close, than on hop-clover, when it has once run into flower; for of the two the hop-clover is the bitterer.

What
grass best
to fat cat-
tle in Sep-
tember and
October.

§ 15. My ground will almost fat cattle in spring, when the sap is flush; but it must be the aftermaths of good ground only, when September and October comes, that will support a bullock, and carry him on when near fat: the poverty of grass at that time may be seen by its dying away, or losing its colour: then such grass is lost on a bullock.

Of winter-
rowet, &c.

§. 16. Mr. Bissy (my tenant in Wilts) a very experienced grazier, was telling me, how much a beast would thrive with his winter-straw, in case he had the liberty of going abroad, and, besides his straw, picking up some winter-rowet, which would give him a better stomach to his straw. — I replied, — I found that by experience; but our hill-country-meads contained so few acres, they would not afford much winter-rowet; but, said I, though rowet, which is of a deadish nature, and afforded the cattle little better than a change only, made the straw more grateful, yet I observed, by giving them with their fodder a taste of the first spring-grass, which was luscious and gnash, nothing would sooner wean them from, and take them more off their stomachs, not only to straw, but to the best hay also; and therefore I carefully kept them from such grass. — He replied, it was, generally speaking, very true; but

but yet that their spring-grass beasts would (before the quantity of grass was sufficient for a maintenance wholly thereon) eat heartily of straw or hay, early in the morning, and whilst the dew was on the grass; for in the spring the cattle do not care for such grass early in the morning, nor till it has been warmed by the sun, and the dew taken off it; because such grass is very cold by the wet lying on it, and the juices are then as yet unconcocted, and you may see the bullocks, at such time, stand under the hedges, forbearing to feed till the dew is off. — All this seems very reasonable, whereas on the contrary, in the summer-time, when the crudities of the grass are taken off, all cattle are more desirous of feeding in the mornings and evenings, while the dew is on the grass; in which sense only Virgil is to be understood, when he says, — “*Et ros in tenerâ pecori gratissimus herbâ.*”

§. 17. I lopt several pollard-oaks this spring (anno 1705) whilst in bud, and let the loppings lie, in order to be faggotted: the beasts of the common came and browsed on them, and the oak-buds killed five of the udder-cattle; see therefore, and prevent such evil for the future.

§. 18. I was telling my ox-hind, I doubted some weanling-calves I had wanted water. — He said, that was easy to be seen; for, if they suffered for want of water, they would not fill themselves, though there was never so much grass, but would look mighty hollow and thin, and go about bleating.

^a Varro advises to water cattle twice a day in the summer and once in the winter.

This winter (anno 1718) I was fully convinced of the great advantage it was to cattle to have water at command in their foddering-yards, so as to have re-

^a Boves æstate ad aquam apellendos bis, hyeme semel. Var. fol. 56.

course to it when they pleased; for the cattle in my cow-yard where they have no water, (but when they are drove to it, and that but once, or at most twice a day, and sometimes are neglected, or drove unseasonably) were in general much more out of countenance, and leaner than four or five cows that the parson joisted for me, and which fed on the same straw, it being the tythe of my farm. — The difference lay only in this, that his cows went when they would to the pond in his yard. — Gentlemen-farmers, having so many irons in the fire, ought to depend as little as may be on servants, but should provide such conveniencies as may, as much as possible, answer the same ends, without the care and trouble of servants.

I wintered this year (1719) twenty two-years yearlings in the French-grass, where they had also the running in the woods, and were foddered in the straw-house, and thus they lived very lusty till March, when, the rowet being gone in the field, and the bud beginning to swell in the coppice, I was forced to remove them, and bring them wholly to straw; I was afraid they would have been much pinched, their rowet being gone, and losing their range, and being confined to the backside; and for three or four days they seemed to look hollow; but then they filled again, and did very well, and I do not a little impute their doing so well to their having plenty of water at command, and to the warmth of the yard: I note this, that I may not fear the consequence in such another year.

Stalled-oxen not to be kept too close.

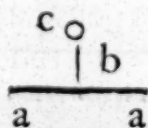
§. 19. Stalled-oxen, if tied up to the house, which is close, have been found of late years (since 1705) not to hold to their stomachs so well as when one side of the house is open, like a penthouse; because, when an ox grows fat, he is naturally very hot; therefore it is best to have the sides of the fatting-

ting-houses open.— In yoking-time, whilst they plough them, if they slip a cord, they never fight, but when fattening, it is likely they may.

§. 20. Farmer Elford of Dorsetshire says, that cattle, which are used to be housed on nights in winter, will be tender, and expect it, and will in winter fall away in their flesh if they have it not; therefore he, not having the conveniency of housing them, takes care not to buy a cow, if he perceives she has been used to be housed. — I asked him how he could perceive that by a cow in a fair; he said, very easily; for such a cow would have the hair of her sides towards her tail clung with dung; which they, who bring her to market, cannot get off without great difficulty; the hair will sooner come away than they can separate the dung from it.

§. 21. Poor cattle may be kept to their good behaviour by slight inclosures; but by experience I find, that cattle well kept, and high in proof, must have very strong bounds, else, when they rise in case, they will soon break through, especially if they want water, or take a dislike to their pasture.

§. 22. The annexed figure represents a clog to hang at the bottom of a yoke, or shackle, to prevent a beast from leaping; it may be increased according to the bigness of the beast.



c, the hole through which the shackle comes. —
b, eighteen inches. — a a, three foot long.

§. 23. Being to send five yearlings to the coppices, that I might hear whereabouts they were, I was to put on bells; so I bid my wood-man get withs for the

Of housing cattle.

Cattle in proof require strong bounds.

A clog for cattle,

Of bells to hang on cattle when turned into the woods.

B b 4

F O D D E R I N G.

the bells. He said, by no means ; for a with would be apt to gall their necks, and the flies would blow the fore places, and, besides that, withs would be apt to hang in the bushes ; but a good strong whitleather collar would do very well ; but, said he, an iron collar, made of a smooth plate, is better, and will not gall, and the bell will sound much better than either with a with, or a whitleather collar ; because the iron collar holds the bell off from resting on their breasts ; whereas, with the other collars, the bell lies on their breasts, whereby the sound will be deadened.

F O D D E R I N G.

Of convenient partitions in a foddering-yard.

§. 1. **I**N the foddering-yards of backfides, or other out-houses, to have several divisions, over and above what is constantly used, has great conveniencies in it ; one of which is, that in them you may dispose of a two-yearling cow, or another cow, at the time of bulling ; not only to keep them from a bull, but from the other beasts also, that would be leaping such a cow, whereby they may hurt each other, &c. — Especially cows forward with calf will be apt to warp by leaping a bulling-cow.

Cattle, if once foddered, will not do without it.

§. 2. The open winters make hay the dearest, if a hard frost and snow come at the forehand of them ; for if cattle once come to fodder, they must be held to it, or they will receive great damage. — In watshy weather all the hay one can give to cattle will not make them thrive, but in dry frosty weather they'll thrive with their meat.

Catt'e grow lousy on bad hay.

§. 3. I am assured by a farmer of Woodhay, in my neighbourhood, in the vale, that there is abundance of hay there so four and rushy, that it is not so good for cattle as straw in a good year, and he has known cattle to grow lousy on such hay.

I was

I was telling this to another farmer, and he said, it was true, and that such fodder ought to be given to cattle but a little at a time, so as not to cloy them; for, if they should be once cloyed with it, they would starve rather than feed on it.

§. 4. Anno 1704, I let my cows go at large from their foddering-yard, during the winter, and so on till April, when they picked up some grass; and those that had calved I baited with hay: the consequence of which was plainly this, that by Mid-April my cows would not stand to eat any straw at all, but were, during the months of March and April, so weaned from straw, by baits of grass and hay, that they fell off from their straw quite, and grew much leaner, and worse in flesh than they had been, and apparently worse than the farmer's cows, which were, after the winter months, wholly pent up to their straw, and to the pond.

§. 5. All sorts of cattle that chew the cud, as sheep, cows, &c. care not to graze after each other, nor to eat one another's leavings in the foddering-yards; but cattle that do not chew the cud will eat after those that do, and vice versa.

§. 6. * Pliny tells us, where hay was scarce it was usual to feed their cattle with chaff and barley-straw. Of chaff, says he, that is the best sort, which is the thinnest and smallest, and nearest to dust; the best therefore is from millet, the next from barley, and the worst from wheat, except it be for hard-labouring beasts.

§. 7. On sound experience I am convinced, that in our hill-country we ought not to have any depen-

* Ubi fœni inopia est, stramento paleam quærunt, hordei stipulam bubus gratissimam servant:—Paleâ (chaff) plures gentium pro fœno utuntur; melior ea quæ tenuior, minutiorque et pulveri propior, ideo optima e milio, proxima ex hordeo, pessima ex tritico, præterquam jumentis opere laborantibus. Plin. lib. 18. c. 30.

dence

dence on sending our cattle out of the foddering-yard to grafs before the middle of May, and therefore we ought to be provided with winter-fodder for cows accordingly; for this year (1720) there was a very wet spring, and it continued so throughout March, April, and May, and yet the natural pasture-grounds did not afford a bite for the great cattle till the middle of May; indeed the hop-clover might be fit to support them a fortnight sooner; but it is a hard matter, tho' one should have a good stock of that grafs, to get the shepherd's leave to hayn it from the sheep for that end, he stands so much in need of the hop-clover grafs for his sheep from the middle of March to the beginning of May.

To fodder
early in
winter
mornings.

§. 8. At the beginning of winter, suppose the latter end of October, and a good part of November, while cattle still continue out in the field at grafs, it is very necessary to fodder them early in the morning, while the hoar-frost hangs on the grafs, which they will not eat kindly of till the sun has warmed it.

Of racks.

§. 9. The stradling racks are best for foddering, if made strong enough, i. e. so as not to be overturned; for these racks may be lifted up as the dung mixen rises, which those fixed in the ground cannot be.

Cribs better
than racks
in the hill-
country.

§. 10. It is a practice in many places, especially in the vale, to tie their cow-beasts up to a rack to fodder; but if one rightly reflects on the places where it is done, we shall find it only used where the fodder is good, being either hay, or very good straw; but in the hill-country of Hampshire, where the cattle have straw-fodder only, and that not so good as the straw in the vale, the custom is to fodder their cows in racks, or cribs, in the open yard, which they think better than tying their cattle up to racks in houses; for tho' in cold and rainy weather
the

the houses may keep their loins dry, yet in countries where the fodder is coarse, especially after wet and backward harvests, when the spirit of the straw is washed out by the rain, the giving cattle straw from racks, from whence they cannot pick and choose, as from cribs they may, is judged to tend to the impoverishing the cattle, whereas in cribs they can pick the sweet from the coarse.

Asking a great grazier in Somersetshire, in what method he fed his fatting-beasts, he told me, he thought it was best for them to reach up to a rack. — I said, I thought not, because reaching and hawling might give frequent qualms to the stomach of a fatting-beast, especially when near fat. — He replied, he did not know but it might; yet if you give them their meat from under them, they will blow upon it, and spoil half of it; so that, if their meat be given them from under them, it ought to be given to them so little at a time, that their breath may not taint it.

§. 11. My shepherd assures me, that my sheep, and other cattle will not eat my spring-vetches made into winter-fodder so well as they will the winter-vetches, the halm of the latter having, he says, more strength and spirit in it than that of the former, the halm of which is loose and woolly. — This seems very reasonable to me, for the spring-vetches, and the straw of rath-ripe corn of all kinds run in a parallel, as white, and black oat-straw, rath-ripe, and late-ripe barley-straw, and I believe the same may be said of rath-ripe peas-straw, and great partridge peas-straw.

Rath-ripe
straw not
so good
fodder as
late-ripe.

Several farmers in my neighbourhood have affirmed to me, that the straw of the Patney barley, otherwise the rath-ripe barley, was hollower, and not so good fodder as the other; but farmer Farthing of the Isle of Wight assures me, that his cattle eat his
white

white oat-straw better than his black; and Mr. Smith of Bishop-Canons tells me, that his cattle eat rath-ripe barley-straw better than late-ripe; so that it seems, the straw of those countries runs finer than ours, their land better agreeing with the grain.

Cattle prefer straw that is just threshed.

§. 12. There is a manifest difference in cattle's eating their fodder, when fresh threshed, and when it has been threshed two or three days, especially if the straw be but indifferent, and coarse fodder. —

I have been often sensible of this, but more particularly this year (1719) in foddering with peas-halm, when the cattle eat it very well all the week-days, while it was given to them as fast as it was threshed, but some, that had lain all Sunday on the floor, they eat but indifferently on Monday; and the more so, because a dry cold wind had blown on it through the crevices of the barn-door. — This also the man, who threshed the peas and gave the straw to the cattle, said was manifest to him.

Short straw preferred to long.

§. 13. It is said, the longer the halm of the corn is the worse it is for fodder; the shortest straw makes always the best fodder.

Oat-straw bad fodder, and why.

§. 14. I asked farmer William Sartain of Broughton, Wilts, his opinion of oat-straw to fodder cattle with. His opinion was, that it ought not to be given frequently to cattle for fodder, but only a little now and then, by way of change; for, he apprehended, there was a roughness or harshness in that straw, which made the gums of beasts, or the roofs of their mouths sore, and said it was the opinion of many that it set their teeth on-edge. — But whatever was the cause, or howsoever they were affected, certain it was, that after the cattle had been held to oat-straw awhile they went off their stomachs, nor would they heartily fall to other straw, nor even to hay, after it. — Another farmer afterwards in
discourse

discourse affirmed it was disagreeable to cattle, and ought not to be given them too often, nor too much at a time, and he thought that it's toughness might loosen their teeth by the strength they were forced to use to chew it, and so it made them unfit to masticate other meat for some time afterwards.

§. 15. Farmer Biggs and farmer Crapp visiting me, the former said, he doubted his fodder would fall short, because he had sowed so much of his barley on one earth, and his straw was much the worse for it. — Neither farmer Crapp nor I could well apprehend that : but said he, the man who threshed for me, told me, that he had observed it to be so. — I afterwards asked several farmers and threshers concerning it, each apart : they seemed to be at a loss how it should be, — but at last I found one, who readily replied, he had often heard it accounted so, and that the straw of such barley was much deader than that of barley sowed on two earths, and that it would starve cattle, if held long to it. — I can conceive no reason for it, except it is because barley sowed on one earth is generally sowed on poor, light, or white land, — and so the straw cannot be fed with so much sap and juice as otherwise it might be, and therefore may be drier at harvest than the straw of corn sown on richer land, and which in it's own nature may require two earths. — An old labourer of mine agreed with Biggs's thresher, and said he could tell one-earth barley from that sowed on two earths by mowing it ; but I could not learn how.

§. 16. Mr. Smith of Wilts assures me, that, amongst them, they give not barley-straw to their horses, but peas-straw, if it be anywise well housed, and that they always look on the great partridge peas-straw to be better fodder (*cæteris paribus*) than the small partridge peas-straw. This I mention here, because

Barley-
straw of
seed sowed
on one
earth bad
fodder.

Peas-halm
for fodder.

FODDERING.

cause I have above noted, that rath-ripe straw of all kinds is worse fodder than late-ripe straw is.— Mr. Smith also says, if their beans are well housed, they give their horses bean-straw, and they eat it very well.

When peas-halm has fallen all along on the ground, and laid for some time, as it may sometimes do, till the grass shall grow through it, such peas-halm is not fit for fodder, the leaves being in a manner rotted off, and the halm is only fit for dung.

Thistles used for fodder.

§. 17. If thistles are cut young, when they are withered the cattle will lick them up, though, whilst they are green and growing, they will not touch them.

Elm-leaves good fodder.

§. 18. Elm-leaves gathered green, and suffered to dry in the sun upon the branches, the spray being stripped off in August, will prove a great relief to cattle in winter, or in scorching summers, when hay and fodder is dear; the cattle will eat it before oats, and thrive exceedingly with it; but you ought to lay these boughs in some dry place, to prevent their musting. — In some parts of Herefordshire they gather elm-leaves in sacks for their swine and other cattle: but some say, they are ill for bees, in that they surfeit of the blooming feeds, which make them obnoxious to the lark, and that therefore they do not thrive in elm-countries. J. Mortimer, Esq; F. R. S. fo. 333.

More profitable to winter oxen than heifers.

§. 19. In winter an ox will pay better for his hay, and thrive faster than a heifer, though her calf should be young within her; — therefore 'tis more profitable to winter oxen than heifers.



C O N-

CONTENTS

Of the FIRST VOLUME.

I NTRODUCTION	Page xi
Arable Land	23
Manure and Manuring	38
Method of Manuring different Lands	59
Of Chalk and Chalking Lands	64
Of Lime and liming Lands	68
Of Burn-beaking	77
Plough and Cart-Tackle	79
Ploughing	87
Of Fallowing	92
Of the Durableness of some Seeds	95
Of Winter-fallowing early for Oats and Barley	108
Of the Method of ploughing for different sorts of Corn	116
Of the Tillage of different Lands	129
Of the Manner of Ploughing	130
Of Ploughing with Horses or Oxen	135
Harrowing	137
Picking up Stones	144
Sowing	147
Of sowing Summer or Winter Corn early on one Earth	159
Of sowing Wheat	169
Of sowing Barley	180
Of sowing Barley and Oats	185
Of sowing Beans	189
Of sowing Peas	191
Of sowing Vetches	202
Of sowing Tills	206
Of sowing Grass-Seeds	207
Experiments on the Growth of Seeds	214
Rolling	

CONTENTS.

<i>Rolling</i>	_____	_____	224
<i>Of Corn in general</i>	_____	_____	232
<i>Wheat</i>	_____	_____	243
<i>Of blighting air</i>	_____	_____	265
<i>Rye</i>	_____	_____	270
<i>Barley</i>	_____	_____	271
<i>Oats</i>	_____	_____	289
<i>Buck-Wheat</i>	_____	_____	295
<i>Beans</i>	_____	_____	296
<i>Peas</i>	_____	_____	300
<i>Vetches</i>	_____	_____	315
<i>Reaping and Mowing</i>	_____	_____	324
<i>Raking</i>	_____	_____	341
<i>Carrying of Corn</i>	_____	_____	342
<i>Threshing</i>	_____	_____	343
<i>Reeks</i>	_____	_____	348
<i>Granaries</i>	_____	_____	354
<i>Thatching</i>	_____	_____	361
<i>Malt and Malting</i>	_____	_____	369
<i>Hops</i>	_____	_____	378
<i>Grazing</i>	_____	_____	379
<i>Foddering</i>	_____	_____	392

End of the FIRST VOLUME.



